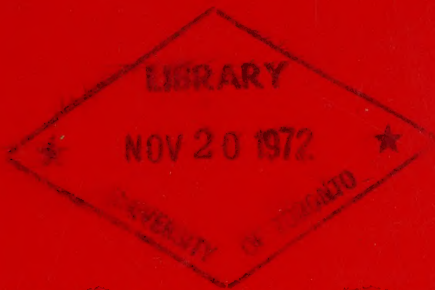
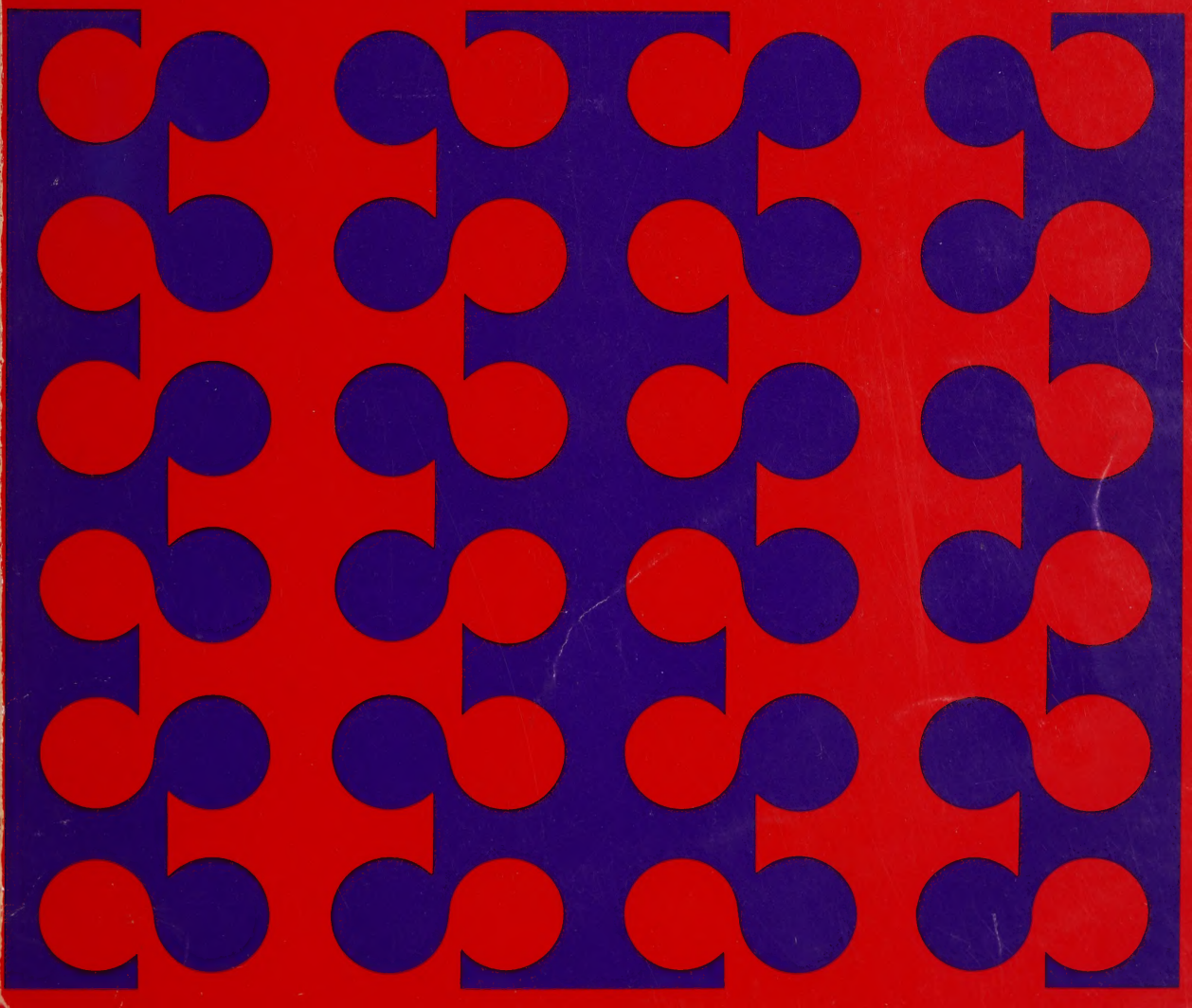


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A Feasibility Study

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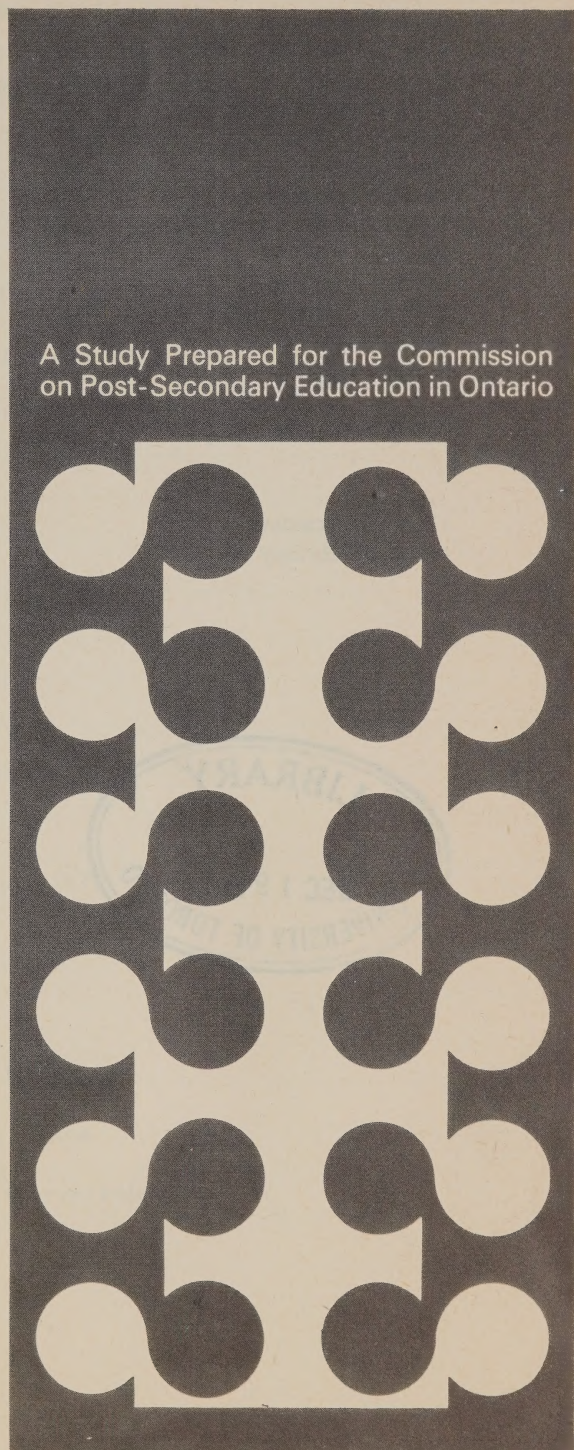
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SOCIAL REPORTING AND EDUCATIONAL PLANNING: A Feasibility Study

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SOCIAL REPORTING AND EDUCATIONAL PLANNING

A FEASIBILITY STUDY

Sponsored by the Commission on Post-Secondary Education
in Ontario

March, 1972

Prepared by: J.S. Kirkaldy

D.M. Black

Commissioners

PREFACE

The impetus for this study originated in the Research Committee of the Commission on Post-secondary Education in Ontario (COPSEO). Our long struggle with the terms of contract for an analytical study of post-secondary education⁽¹⁾ brought us to realize that the most problematic and interesting aspects of the subject did not enter within the confines of a conventional cost-benefit study. These "externalities" - the spillover or social effects of education - were first identified in Plato's Republic⁽²⁾. Indeed, the Republic is concerned almost entirely with the education of citizens; discussion of the nature of private benefit, which is so much a part of modern analyses, is lacking. Questions about the relationship between education and innovation or societal stability remain among the chief concerns of those who wonder about the status of education in a democracy, yet quantitative approaches have not to this day been adequately articulated.

While this study attempts in part to deal with these elusive "externalities" in education, it recognizes that the social benefits of education cannot be viewed in isolation from the totality of social welfare services. Consider the close connection between medical education and the availability of medical services, or the documented relationship between the health of a population and the spread of literacy.⁽³⁾

Rejecting the piecemeal approach to social analysis, we argue instead that the development of a comprehensive social report as an aid to policy-making and as an information source for the consumers of social services is necessary and possible. Freely admitting that in broadening the scope of inquiry within limited resource and time constraints we have drastically limited the possible depth of analysis, we have nonetheless sought to elucidate the theoretical and methodological problems of social reporting, to produce an outline of one model of a report with emphasis on the educational arena. and to make a start on a list of data needs, contributing agencies and locales for production of a social report.

(1) List of references begins on page 195.

Due to resource and time constraints this study had to be compiled from a number of independent reports. Despite our best editorial efforts, a stylistic unevenness remains. As the organizers, compilers and editors we assume full responsibility for this defect, for possible inconsistencies between chapters and for all errors of commission and omission.

We nonetheless gratefully acknowledge the contributions made to the formulation of this study by the Research Committee of COPSEO, and in particular the many stimulating discussions we enjoyed with Lindsay Niemann, Bob Kymlicka, Doug Wright, Les Green, Dave Stager and Bill Newnham. We are also greatly indebted to our research contractors who almost invariably met what seemed at first sight to be unrealistic deadlines: Tony Hyde, Ottawa (Social Mobility), Pete Warrian, Waterloo (Stability, Public Order and Safety; Entrepreneurship, Technology, Research and Development), Colin May, Ottawa (Income and Poverty, Health and Illness), George Seaden, Montreal (Our Physical Environment), Pierre Bourdon, Chambly, Quebec (Participation, Openness and Responsiveness) and Liz Paul, Toronto (Learning, Science and the Arts).

We owe a special debt of gratitude to Anita Miltimore who nursed the manuscript through a number of messy drafts.

The opinions and conclusions contained in this study are solely those of the authors, and publication of this study does not necessarily mean that the opinions and conclusions contained therein are endorsed by the Commission.

J.S. Kirkaldy

D.M. Black

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SOCIAL REPORTING AND EDUCATIONAL PLANNING

A FEASIBILITY STUDY

1. GENERAL INTRODUCTION

1.1 Forces Promoting Social Analysis

The problem of social indicators and social reporting has in recent years received much attention in the nations of the West^(4, 5, 6). While the notion of a societal progress report (annual or otherwise) is not new, that part known as the economic report is the present limit of institutional achievement in the advanced countries of the world. This consists of head-counts, inventories of stocks on hand (the census) or the monetary value of certain stocks or activities. The Gross National Product and Price Indices are familiar examples of such reporting. Since the acceptance and utilization of such indicators are based on centuries of economic practice they have attained the status of a dogma, a base for a new Philistinism and a contributor to a kind of self-fulfilling prophesy. During this century in most countries, societal goals have invariably been formulated in terms of economic ends and so the approach to such goals is by definition measurable. "Externalities" under such circumstances are invariably ignored and incentives to develop more comprehensive and possibly realistic social indicators are undermined.

Nonetheless, in recent years the standard measures of progress have received widespread criticism⁽⁷⁾ and governments, showing genuine concern about the overall quality of life, have raised the possibility of altering our notions of progress and the need for developing more comprehensive indicators of the state of society. Such indicators must be designed to support decision-making on the part of both citizens and legislators.

The social reporter must first answer two questions: What activities

are to be included and how will we quantify the included activities? We may all agree that the objectives of the average individual in the affluent society are selfish and simple: a full belly, a comfortable home, health, a family, a month's annual holiday, one or two automobiles and/or boats, the love and respect of other people or small animals, a little power over other people or small animals, a modicum of vocational mobility and achievement, freedom from bureaucratic and mental stresses, freedom from war and unemployment and a reasonable sublimation of the death-fear. At the same time there is widespread disagreement about how to achieve these various outcomes, and indeed, as to whether they are at all compatible. In part the disagreements reflect different conceptions of society. For example, in the area of housing some argue for more government intervention while others argue for less. There are not only disagreements about policy options but also about the nature of society.

Such disagreements on the nature of social reality might be settled if a social theory as comprehensive as current physical theories existed. For just as the theoretical syntheses of Copernicus, Galileo, Kepler, and Newton led to precise quantitative accounting within the physical universe a universal social theory could set the stage for precise social accounting. Thus the road to social reporting must pass through the shredded landscape of argument on social theory and the problems of measurement.

1.2 Social Theory as a Base for Social Accounting

Opponents of activity in the area of social accounting often argue that the exercise is fruitless because there is no general social theory. Such a pessimistic attitude invites query, not only because the life and social sciences are reasonably well advanced, but also because our politicians, with all their obvious faults, are often successful in shepherding the course of social progress.

We surmise that this hesitancy and pessimism stems in part from a logical difficulty, which derives in turn from a failure to realize that the semantics of a language used within a (logical) system must never, under threat of contradiction, be used to express the truth values of that system. Because current social theories fail to define the values of a given social system within the language of the system, they are naively, and incorrectly held wanting. This is a mistake which religion never makes - it always insists that societal values be defined from outside the system.

In an anticlerical milieu, the extra-system establishment of truth-values is handed to government commissions who are expected to synthesize their religio-politico-scientific perceptions into a consensus value system. To the extent that these perceptions are purely scientific, the exercise becomes to a large extent circular (but not necessarily useless), for the scientist who describes the general evolutionary outcomes of the biological, aboriginal, or modern community as stability and adaptability can do no more nor less than recommend these survival values as general objectives for his own sub-system.

This tautological aspect of rational objectives (we will be what we have to be) does not imply that the process of defining and pursuing objectives is useless. Such would only be the case in an absolutely stable milieu. In an expanding or changing intellectual and physical environment with corresponding adaptation within the social system, the logical circle cannot close precisely upon itself. That is to say, good objectives can at best set the stage for satisfactory outcomes.

The social theorist is properly concerned with the description of society and its outcomes. He is not concerned with "objectives" which are a part of societal language, not of his own. The social reporter must on the other hand, be equivocal, for he often uses objectives as proxies for

possible outcomes. Furthermore, one of his main functions is to advise the seers (commissioners and legislators) who are simultaneously part of, and external to, the system.

Social theory has much to do with delineating the forces and relations which make for stability and adaptability in dynamic systems. This particular dichotomy of societal outcomes appears uniformly in social theory from Kant and Hegel to the present day. It is synonymous with Hegel's dialectics, ⁽⁸⁾ with the most general tenets of Herbert Spencer's sociology, ⁽⁹⁾ with Arnold Toynbee's historical conceptions based on challenge and response ⁽¹⁰⁾ and with Norbert Wiener's concepts of systems analysis based on analogy with biological homeostasis ⁽¹¹⁾. In the latter case "feed-back" and adaptability are to be regarded as equivalents. While there exists no synthesis of the diverse contributions to social theory which is universally accepted, there is a general acceptance (explicit or implicit) that the dynamics are to be understood in terms of a mixture of forces for moderation and mutation.*

Let us re-emphasize the importance of the dichotomy or conflict (not contradiction) between the properties "stability" and "adaptability". Societies which are overstabilized through the accretion of institutional and/or cultural constraints have low adaptability in a changing environment and thus a low survival value (e.g., the South and North American aborigines). Societies on the other hand with high adaptability (and thus limited internal constraints) may fluctuate so greatly in a static environment as to lose their efficiency and thus too their survival value (Is this the current state of the United States of America?). The system which is viable in both a changing and a static environment must have an appropriate balance between the conflicting trends. It is worth noting that western civilization during the last millenium has placed increasing emphasis on its adaptive ability by loosening its institutional constraints, and this trend is continuing. The social philosopher may well ask how long this process can go on before the internal fluctuations become so

* Some approximate synonyms in pairs are conservation and progress, stability and adaptability, equity and progress, static and dynamic, challenge and response.

great as to irreversibly undermine the general efficiency of the system.

Finally, we reiterate our belief that there exists a satisfactory basis for a general theory of social systems, a theory which in its pristine form refers to the statics and dynamics of open material and information flow systems (In social sciences, societal systems which are open to new resources and intellectual stimuli.). There also exist particular theories for sub-systems within social systems which provide sound causal relations between inputs and outputs. Primarily lacking is a language which is common to all systems and sub-systems, and universal and interchangeable rules and procedures for measurement are therefore also lacking. Social accounting, while capable of gaining part of its structure from current social theories, will in turn make a major contribution to the substance of the theoretical framework.

1.3 Problems of Measurement in Social Science

The current quantitative successes of the physical sciences, and their purported attachment to total objectivity have created an exclusive measurement and methodological pattern which leads the public and many social scientists to believe that social affairs must remain in a non-quantitative limbo. Economists, who have just barely cracked the door of quantification tend to be insistent proponents of the scientific method. Notwithstanding its aura of respectability, a rigid scientific methodology is intellectually and pragmatically vulnerable. In the first instance it places emphasis on those quantities for which the phenomena and their measurability are indistinguishable.* Such phenomena will never appear in the social arena for they will all have been usurped for study by the physicists. In the second instance, where physical behaviour and measurability are distinguishable, the scientist has always felt free to escape into probabilistic concepts and subjectivity. Thirdly, in the

* The serial action in space of a spring-loaded lodestone (or magnet) is taken as the definition of another serial quantity called the magnetic field.

case of those concept-generating phenomena where quantity and quality are not clearly delineated, physical science has been content to allow its concepts to evolve for a century or more.

A latter case in point has to do with the concept of temperature. The confusion between the qualitative and quantitative aspects of the psychologically and physiologically clear concept of hotter or colder took more than a century to dissipate. Consensus now holds (without logical contradiction) that every body contains a quantity of heat and that the quality or intensity of that body associated with the heat is its temperature. Von Neumann and Morgenstern have suggested that many economic and sociological concepts will have to go through a similar evolutionary development of meaning.⁽¹²⁾

It may be helpful at times to draw on physical analogy in defining concepts, although the indiscriminate use of the procedure is fraught with danger. While the economic concepts of value and utility have certain intensive properties in common with "temperature" they are in fact much more complicated than the latter static system quality. To change the value or the utility of a commodity, the commodity and/or its surroundings must undergo a process. These concepts refer therefore to dynamic systems, so physical analogies, if they exist, must be found in dynamical physical systems.

The foregoing suggests that a rewarding tactic for achieving a quantitative theory in the social arena will be to relate social concepts to physical concepts for which measurement systems and methodologies are already well-articulated. While the time is now ripe to proceed in this way the development still remains far too technical for the present exercise. (See Appendix)

The second tactic, which is perhaps best developed in the field of social psychology, takes a vague and non-physical concept (like intelligence) and through a process of empiricism and subtraction arrives at a limited meaning of the term which is operational and quantifiable. Lazarsfeld⁽¹³⁾ lists four steps in the establishment of social sub-system variables:

an initial imagery of the concept, the specification of dimensions, the selection of observable indicators, and the combination of indicators into indices . Such a classification and distillation process, leading for example to the Intelligence Quotient, is in the best sense of physical methodology. In the I.Q., Binet and others can claim to have discovered an invariant of a particular restricted type of social system.

In the present context the foregoing methodologies are to be brought to bear on a specific complex information and material processing system for which the broad dynamical laws are known, if not yet completely synthesized . The central problem of social reporting has to do with the delineation of all the important sub-system variables, the inputs, the outputs and the causal relations between them.

1.4 Social Reporting - There and Here

Social reporting is a process that goes beyond the application of theory and measurement, as described in the previous sections, for it aspires and purports to be an effective vehicle in the feed-back, self-correcting process whereby the social system seeks stability in a static environment and orderly change in a changing environment. As pointed out earlier, to perform within this equivocal milieu, the social reporter must find the intellectual resources and adaptability to be simultaneously of, and external to, the social system.

Social reporting is one formalization of the natural feed-back process whereby wise governments respond to articulated social unrest. The multi-party political system is another such formalization. Both are societal devices for increasing the effectiveness of information channeling and responsiveness to internal and external change.* It is to be emphasized that in our concept of social reporting, as in social theory, there is both a static and a dynamic component. The static component may be designated as social

* As an ultimate stabilizer, social reporting, like an effective political party system, must be anathema to the true revolutionary. While both may appear subversive to certain privileged classes, they are actually strong conservative forces.

accounting (the "snapshot over time" approach). The dynamic component has to do with the establishment of the causal relations between inputs and outcomes. This is the part of social reporting that must rest on viable theory; for reasons already indicated, it has to all intents and purposes been ignored in current practice.

There are numerous discussions of social reporting in the literature. Two examples of more or less final versions have recently been published.^(4, 5) While both of these are primarily concerned with social accounting (or statics) their approaches and emphases are sufficiently different as to be informative. Toward a Social Report assumes a strong set of social goals as the basis for its slate of activities, and as such comes through as a powerful political document. While rather short on data and indicators the report does attempt to outline some of the causal relations and to suggest alternatives. Social Trends with typical British restraint, assumes that in the absence of either a theory of society or comprehensive social indicators it is best to select activities and areas presently of concern to citizens and policy-makers. It states that "Social indicators as a means of summarizing trends in certain fundamental aspects of society would obviously be relevant to a publication such as this. However, there are considerable difficulties in their development. Any successful outcome of the studies now being undertaken will be reported in future issues."

Although we have not recognized any explicit activities of this kind within Canadian bureaucracies it is worth noting that the Annual Reports of the Economic Council have tended increasingly to draw attention to the externalities of economic activity. Furthermore, many departments at both the federal and provincial levels are turning to "program budgeting", an internal control activity which demands a clear statement of objectives and a continuous monitoring of outcomes. Such a budgetary system can be nothing more than an academic exercise if it does not generate a large part of the data required for social reporting.

Social accounting as exemplified in the aforementioned British and

American reports consists of a slate of activities whose measurement over time presents a picture of how a society is progressing (or regressing) in terms of these selected activities. There is no sense in which the aggregation into indicators of data associated with such slates can represent a dynamic picture of society. This limited static approach nonetheless affords the opportunity to take a number of non-inclusive snapshots of human activities.

Lacking at the start a detailed social theory, the activities to be included must be chosen to correspond to currently articulated societal goals, and thus will be ideologically based.* There are obvious pitfalls here which can only be ameliorated by a gradual testing of the slates through the public and bureaucratic response to them. The format of the report must accordingly be predicated upon the public(s) to be reached. One format for legislators and the general public and another for policy planners (and some legislators) would seem logical.

Having noted the dangers of political bias in the choice of activity slates and the impossibility of inclusiveness, we draw attention to a further source of bias and error. Much of the data utilized by the social scientist or statistician are gathered for much different purposes than that of the development of social reports or general theory. Data from a census is a case in point. It is easily demonstrated that such data is not value-free, but rather reflects present choices about how, and implicitly why, people are to be counted and measured. Some assumptions may be similar to those of a social report and some may not. For example, a people may be concerned with the increasing bureaucratic nature of their society. The social reporter is here in a dilemma, for it is in part the data generated by bureaucracies which is the basis of many social indicators. (It is just at this point that some astute observer may see social reporting as evidence of more

"Differences imply choices and choices imply judgment. We cannot escape from making judgments and the judgments that we make arise from ethical preconceptions that have soaked into our view of life." (14)

bureaucracy and not less.)

There are a number of other pitfalls and problems of a more specific nature for the social reporter. Lack of data, inaccuracy of data, conflicting indicators and incompatible models all can contribute to the difficulties of the researcher and reporter. Worse still, these inherent characteristics of current social investigation are often used by those who oppose too close a look at society to discredit efforts in this direction. For the most part, these special problems will be raised and discussed in relation to the specific components of the social slate.

In concluding this section we reiterate our observation that current examples of social reporting do not speak explicitly to the dynamics of the given social systems. That is to say, they do not specify the causal links, knowledge of which would assist the public and the legislators in identifying the pressure points for effective change. In our approach, which is outlined in the following section, we make a first tentative step in this direction.

1.5 Our General Strategy - Dynamics as an Essential Component

A dynamic component of the analysis is introduced by classifying a set of fairly conventional activities, relevant to Canada or Ontario, into the antagonistic causal imperatives described by the terms moderate and mutative. Synonyms such as static and dynamic, or stabilizing and adaptive, are also appropriate. In short, there is a need to explicitly recognize activities which both conserve and transform society. This classification device roots the analysis firmly within the theoretical framework outlined earlier and thus provides a tool for delineating courses of adjustment and alternative paths in the evolution of society.

Within each of the general activity areas we have introduced sub-slates without giving an explicit rationale for the slate selections. The bases of these choices are most often connected with our conception

of current social values, patterns of government spending and popularly articulated policy problems within the ideal capitalist model. Acknowledging the lack of guidance that an overall theory and comprehensively developed indicators would provide, our tactic has been a simple-minded and pragmatic one.

We would be remiss if we did not re-emphasize the tentative nature of this contribution. Our terms of reference categorized the exercise as a feasibility study. We chose to express our own prior conviction as to feasibility in the form of a model report and a practical proposal for further study, analysis and activity to transform the model into a socially useful instrument.

We make no excuse for the evident polemic nature of our contribution for this is in a strong sense a "consumer's report". We sincerely hope that those who object to such a characteristic in a purportedly scientific exposition, will see it not as a cause for rejection, but as a challenge for seeking progress towards a more scientific ideal.

1.6 Societal Objectives and a General Slate of Activities

It is necessary in early versions of social reporting to borrow analytical categories from lists of objectives which have already gained a modicum of acceptance within society. Such a slate of categories or activities was given in the U. S. publication Toward a Social Report⁽⁴⁾, viz:

Health and Illness: Are we becoming healthier?

Social Mobility: How much opportunity is there?

The Physical Environment: Are conditions improving?

Income and Poverty: Are we better off?

Public Order and Safety: What is the impact of crime
on our lives?

Learning, Science and Art: How much are they enriching
society?

Participation and Alienation: What do we need to learn?

Our own preliminary slate which is based on the above, is divided in Table 1 according to our two previously articulated dynamic imperatives:

TABLE 1

SLATE OF ACTIVITIES IN THE SOCIAL WELFARE ARENA

MODERATIVE ELEMENTS			MUTATIVE ELEMENTS	
1. Stability, Public Order and Safety	2. Maintenance of Health, Well-being and the Environment	3. Learning, Science and the Arts	4. Adaptability: Openness, Responsiveness and Participation	5. Exploration, Entrepreneurship, Research and Development

We see learning as the central element in the generation and mediation of changes in all other elements of the slate. This category is accordingly placed in the median position of the Table and its exposition is located for logical synthesis in the penultimate chapter.

While elements 1 to 4 are inclusive of the categorization in reference (4), number 5 appears only implicitly in the latter. This is perhaps understandable since the U.S. gets high marks in this area and pressure for improvement is therefore not great. In Canada, however, our performance is recognized as unsatisfactory, so it should become (indeed, is becoming) a subject of active discussion and measurement.

As a brief summary of objectives we take it that our kind of society aims for progress and equity. We espouse the Western predilection for creativity, development and change in a calculated juxtaposition to the long-favoured value of societal stability. We assume that wise governments and their leaders seek to provide a milieu for a delicate balance between those moderate and mutative influences which produce marginally stable and adaptive social systems. Equivalently, we assume that they persistently address themselves

to policy questions like:

1. Are we achieving the ideal division of resources between subsidies for job creation and for welfare (including unemployment) benefits?
2. Are tax holidays showing a broad benefit to society or do they primarily benefit the corporate recipients?
3. Is effective policing of corporate polluters being developed which is consistent with healthy economic progress?
4. Will expanding expenditures on educational accessibility result in further improvements in health-care delivery and a reduction in poverty and crime?
5. What is the relative cost effectiveness of super-highway construction and post-graduate education in advancing economic progress?
6. Are we making sufficient progress towards greater participatory democracy?
7. Is the income distribution moving rapidly enough towards our ideal of economic equity?
8. Are we moving rapidly enough towards our ideal of environmental quality and away from gross over-consumption?
9. Is our cultural status in the family of nations improving at a satisfactory rate?
10. Are the monopolistic practices of the professions and unions preventing progress towards greater equity?

11. Are we providing youth with sufficient opportunities for participating materially and spiritually in society?
12. What factors under our control are most effective in counteracting crime?
13. Are we becoming healthier?

Social reporting is an essential tool for clarifying and phrasing such questions as well as for generating answers to some or all of them.

2. STABILITY, PUBLIC ORDER AND SAFETY

2.1 Introduction

It is appropriate that the first chapter of this essay should be devoted to that most controversial of all social activities, the preservation of public order, for it highlights the basic and essential conflict between the public weal and individual freedom, a dichotomy which is deeply woven into the fabric of all societies. It might be convincingly argued that since public disorder and criminality are indicators of failure in society as a whole, their incidence should be recognized simply as negative indicators for other social activities and that emphasis in social reporting should therefore be directed towards the more positive activities of the social arena. On the other hand, societal stability has definite positive values which cannot be lightly dismissed. The orderly flow of traffic, for example, provides positive benefits to governments, corporations and individuals alike. Furthermore, in a truly equitable society, the wrath of the law falls equally on the corporate and individual aberrant. While to many the law still seems to seek out and discriminate against the weak and disadvantaged and to close its eyes to corporate misdemeanour, we cannot fail to recognize the improvements in corporate responsibility through the vehicles of law and legislation since the 19th century heyday of the "robber baron".

In an objective social report the term "public order" refers indiscriminately to possible and measurable activities of governments, law enforcement officers and agencies, corporations and the man on the street. The activities of the FLQ and the over-reaction of the authorities following the invocation of the War Measures Act must both be regarded as strong forms of "public disorder".

The policy question which faces the legislators in this context is trite and easy to articulate: What is the ideal degree of restraint on

the activities of corporations and individuals which will sustain equity and community interests while at the same time abetting those essential elements of progress, entrepreneurship, individuality, creativity and dissent? As we shall see in our later discussion on preservation of the environment, governments face painful policy decisions in this context in formulating corrective measures against industrial pollution.

Available statistical data on public order is limited almost entirely to the criminal activities of individuals. While corporate convictions are undoubtedly a matter of record they do not seem as yet to have attracted the attention of either researchers or Statistics Canada. This is an oversight which must be remedied before a balanced social report can be generated. In the meantime, evidence of progress in the protection of the public welfare from corporate excesses can only be inferred from the legislation on the books and the severity of the penalties recorded for various misdemeanors.

It is not generally perceived that governments themselves are often guilty of acts which if not illegal, strain the limits of propriety: "Pork barrel" politics, abetment of graft, indiscriminate expropriations, failure to enforce protective legislation, use of public resources for politicking, indirectly or directly, all represent forms of public disorder, if not criminality. Perhaps properly, our society takes the position that the legislator, when culpable, must face the law as an individual, while his government receives its just deserts at the hands of the electorate (e.g., the Trans-Canada Pipeline affair). Nonetheless, in a system of imperfect information such as ours, there are obvious flaws in the arrangement.

The first major section of this chapter deals with criminality, primarily of individuals. Distinctions will be made between major and minor crimes, violent and non-violent crimes, crimes against persons and crimes against property. Offenders will be further analyzed in terms of age, race and class. By setting criminality in this social context, interrelations between this and other areas of the social slate such as

poverty and social mobility will become evident.

The second major section will deal with the agencies of social control: the law enforcement officers, the courts, prisons and mental institutions. While the inclusion of psychiatric hospitals (being usually regarded as more curative than punitive) may seem strange to many, recent major trends in Canada towards psychiatric sentencing justifies this addition. This section will also attempt to clarify some of the general myths and realities about legal restraint in Canadian society, particularly in comparison to the United States. This is necessary because in several ways police power, admissibility of evidence, discretionary power of judges and the restraining institutions are more open to abuse than in the American situation. Unfortunately, very little study or data collection has been focussed on the specific character of such Canadian institutions, so we can do little more here than suggest directions for analysis.

The third section deals with corporate responsibility and the associated controlling legislation. We will, however, forego a discussion of a number of important elements of public safety, viz., fire laws, traffic laws, labour protection laws and industrial safety regulations.

As suggested earlier, social indicators on the question of public order and safety can serve as imperatives to action on the slate of activities of the social report as a whole. This transposition is essential if we are to realize a positive notion of public order as part of the commonweal. It seems fair to postulate that if equality of access and distribution of social resources were achieved then much of the individual criminality aspect of public order would disappear.

2.2 Criminality

In Canada, as elsewhere, the official statistics on crime are an uncertain measure of the actual number of crimes or of the characteristics of

offenders. Only a sample of crimes come to the official attention of the police, either because the victims fail to report them, there are no victims, or because the evidence necessary to establish the existence of the crimes is not uncovered by the police, (e. g., gambling or traffic offences). Thus, any of the available crime statistics must bear the qualification, "crimes known to the police". The true incidence of crime, varying according to the offence, may be up to ten times the known rate, according to a recent U. S. inquiry.⁽¹⁵⁾

Regardless of the accuracy of the official statistics, there seems to be a popular presumption that there is a growing prevalence of crime in our society. A major influence in the formulation of this view is Canadian exposure to news and opinions from the United States where the concern over "crime in the streets" and civil disorder has occasionally become hysterical. Hence, it is doubly important to specify whether crime rates are changing, and if so, which categories of crimes are most affected.

It is a commonplace to suggest that Canada is a less violent society than the United States. This is borne out by the crime statistics in Table 2, particularly in regard to crimes of violence in comparison to non-violent crimes of gain.

TABLE 2⁽¹⁶⁾

Selected Offences Known to the Police in Canada and the United States, 1966
Rates per 100,000 Population

Canada*		United States†	
Rape	3.3	Forcible rape.....	12.9
Robbery.....	28.5	Robbery.....	78.3
Breaking and entering	510.3	Burglary.....	699.6
Theft (over and under \$50)	1,330.6	Theft (over and under \$50)	1,520.4
Theft--motor vehicle.....	198.1	Auto theft.....	284.4

*Based on Dominion Bureau of Statistics. *Crime Statistics, 1966*, p. 16 and Dominion Bureau of Statistics Census Statistics.

†Federal Bureau of Investigation. *Uniform Crime Reports, 1966*. Washington: U.S. Government Printing Office, 1967, pp. 58 and 110.

Still, there has been a long-term major increase in criminality, as a whole, in Canada. Total convictions for offences of all types rose from 42,148 in 1901 to 4,066,957 in 1965. Translated into rates per 100,000 population 16 years and older, this means an increase from 1,236 to 32,010, a twenty-five-fold growth.⁽¹⁷⁾ However, the composition of the increase makes the figure much less awesome. The increase in summary offences has accounted for 98% of the total, and, of these, 90% of the summary convictions have been for traffic offences. Hence, the greatest force for criminality in this century has been the motor car.*

More seriously, the incidence of indictable convictions has increased from 165 per 100,000 population in 1901 to 615 in 1966. At the same time, and due to inflation of crime due to the automobile, there has been a decrease in the number of indictable offences as a percentage of all convictions, from 13.4% in 1901 to 1.0% in 1965.

The character of the increase in indictable crime in Canada since the turn of the century can be better understood by specifying three major categories of indictable offences: offences against the person, offences against property with violence and offences against property without violence. The trends within this century are given in Fig. 1.

* This statement is not entirely facetious. Traffic offences and their motivation reflect some significant loosening of traditional social restraints.

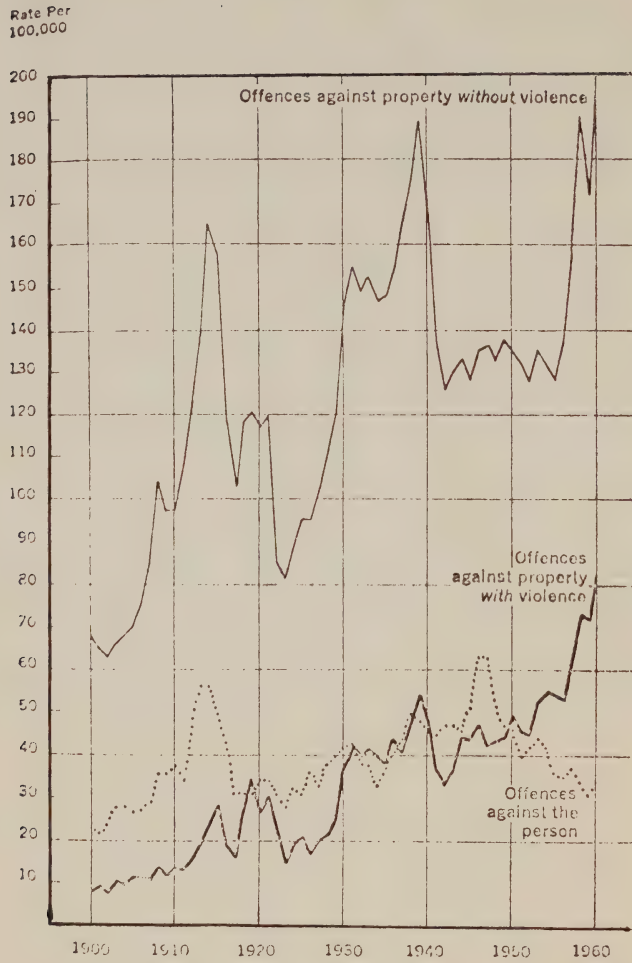


Fig. 1. Changes in rates of convictions for three major classes of indictable offences, Canada, 1900-60. (18)

Thus, the long-term trend seems to be away from crimes against people, with a significant rise in crimes against property, the majority of the latter not involving violence. This trend is confirmed in more recent figures comparing 1950 and 1966, as in Table 3.

TABLE 3⁽¹⁹⁾

Persons Convicted of Indictable Offences, Canada, 1950 and 1966
Rate Per 100,000 Population, 16 Years and Older

Name of Offence	1950	1966
Offences against the person.....	62	53
Robbery and extortion.....	7	8
Breaking and entering.....	39	53
Theft.....	106	146
Other non-violent crimes against property.....	38	47
Other Criminal Code.....	75	41
Other federal statutes.....	6	3
Total.....	333	351

The major and most perplexing question to be asked with respect to these figures is whether or not the increases are to be expected given the migrations and the major social and economic changes which have occurred in Canada since the turn of the century. The most significant population shift has been from rural to urban and industrialized communities. We note that the urban to rural crime rates differ by a factor of approximately 3:1. The data in Tables 4, 5 and 6 are strongly suggestive that migrations associated with economic change are indeed the major cause of the increase in crime rate.

TABLE 4⁽²⁰⁾

RESIDENCE OF PERSONS **CONVICTED** OF INDICTABLE OFFENCES, FOR
CANADA AND PROVINCES, 1956 AND 1961. RATES PER 100,000
POPULATION 16 YEARS AND OLDER

	1956		1961	
	Urban	Rural	Urban	Rural
Canada (excluding Yukon and N.W.T.)	283	185	361	194
Alberta	387	246	586	246
British Columbia	356	332	461	344
Manitoba	343	210	462	203
Ontario	285	204	365	186
Nova Scotia	280	205	348	223
Saskatchewan	363	126	422	129
Newfoundland	334	121	385	131
Quebec	212	142	254	162
New Brunswick	305	135	169	214
Prince Edward Island	217	56	155	19
	Number: 26,844		Number: 37,347	
	Residence not stated: 567		Residence not stated: 1,332	

TABLE 5⁽²¹⁾

TYPES OF INDICTABLE OFFENCES COMMITTED BY URBAN AND RURAL
OFFENDERS, 1956 AND 1961. RATES PER 100,000 POPULATION 16 YEARS
AND OLDER

	1956*	Urban 1961†	Change	1956*	Rural 1961†	Change
Homicide	1	1	0	1	1	0
Assault offences	37	33	-4	26	28	+2
Sex offences	9	11	+2	6	7	+1
Family offences	1	1	0	1	1	0
Commercialized vice	12	14	+2	2	2	0
Gainful offences with violence	48	71	+23	28	46	+18
Malicious offences against property	5	6	+1	5	6	+1
Theft	108	166	+58	60	78	+18
Fraudulent offences	24	37	+13	14	15	+1
Motor-vehicle offences	25	3	-22	35	5	-30
Other	13	19	+5	8	9	+1

Number: 1956 - 26,846; 1961 - 37,001

Residence

not stated: 1956 - 567; 1961 - 1,678

TABLE 6⁽²²⁾

COMPARISON OF PERSONS CONVICTED OF INDICTABLE OFFENCES.
POPULATION IN CITIES AND METROPOLITAN AREAS, AND RATES OF
GROWTH, BY PROVINCES (RANK-ORDER OF PROVINCES IN BRACKETS)

	<i>Indictable Offenders 1961 *</i>	<i>Delinquents 1961</i>	<i>Percentage of Population in Centres 30,000 , 1961</i>	<i>Percentage in Census Metro Areas 1961</i>	<i>Percentage Increase in Population 1956 - 1961</i>
Canada	328	449	34.9	44.8	13.4
Alberta	476 (1)	500 (3)	44.9 (1)	46.3 (5)	18.6 (2)
British Columbia	464 (2)	684 (1)	29.0 (5)	58.0 (1)	16.5 (3)
Manitoba	391 (3)	435 (4)	36.6 (4)	51.6 (3)	8.4 (6)
Ontario	337 (4)	628 (2)	37.4 (3)	52.2 (2)	35.6 (1)
Nova Scotia	296 (5)	382 (5)	23.5 (7)	25.0 (6)	6.1 (8)
Saskatchewan	293 (6)	150 (10)	26.0 (6)	—	5.1 (10)
Newfoundland	273 (7)	374 (7)	13.9 (9)	19.4 (7)	10.3 (5)
Quebec	244 (8)	270 (8)	38.8 (2)	47.0 (4)	13.6 (4)
New Brunswick	191 (9)	379 (6)	16.6 (8)	16.0 (8)	7.8 (7)
Prince Edward Island	64 (10)	243 (9)	—	—	5.4 (9)
*Rate per 100,000 population 16 years and older					
Rate per 100,000 population 7-15 years of age					

In the absence of internal indices and the presence of complex social changes, the only appropriate measures of relative progress or regress would appear to be comparisons between countries which have undergone comparable urban and industrial transformations. For example, as indicated earlier, a comparison of Canada and the United States indicates that we have fared relatively well in the growth of serious, violent crimes. We qualify this by the statement that comparisons are difficult because of different categories and different legal codes in the two nations. A comprehensive social report would include detailed comparisons of trends in all the countries of the Organization for Economic Co-operation and Development.

The perspective opened up here for the development of comprehensive social indicators of criminality must run in the direction of analyzing the social conditions and causes of crime. Towards this end we shift our attention towards an analysis of criminals, or at least toward those who get caught.

It is desirable from the standpoint of social reporting to construct a social profile of "the criminal" based on education, age, race and class. While completely adequate statistics are not presently available at the desirable level of precision, even a rough profile immediately suggests interrelations with other factors and areas of the slate of activities comprising a social report, as well as other indicators of general processes and priorities. Following is a construction of such a profile on the basis of available data along with suggestions for further research.

The data strongly suggests that the crime rate declines as the level of education rises as indicated in Table 7.

TABLE 7⁽²³⁾

EDUCATIONAL LEVEL OF PERSONS CONVICTED OF INDICTABLE OFFENCES,
CANADA, 1951 AND 1961, RATE PER 100,000 POPULATION
16 YEARS AND OVER

	1951		1961	
	Number	Rate	Number	Rate
No Schooling	915	462	424	242
Elementary School	17,012	361	18,533	367
High School	7,590	220	14,412	252
Above High School	882	149	499	66
Educational level not stated: 1951 - 2,576; 1961 - 4,811				

Furthermore, the pattern of offences differs by educational level. Offenders with the most education appear to be least likely to engage in violent predatory offences and ordinary theft, while being more prone to fraudulent means of obtaining money. Violence against other persons is also more characteristic of offenders of lower educational attainment as summarized in Table 8:

TABLE 8⁽²⁴⁾

PERCENTAGE DISTRIBUTION OF INDICTABLE OFFENCES BY EDUCATION
OF PERSONS CONVICTED, CANADA, 1961

	No Schooling	Elementary	High School	Above High School	Not Stated
Homicide	0.7	0.3	0.2	0.0	0.2
Assault offences	19.8	10.4	8.5	8.8	13.0
Sex offences	6.8	3.0	2.9	5.8	3.0
Family offences	0.9	0.2	0.2	1.0	0.3
Commercialized vice	1.1	2.2	3.8	3.4	6.9
Gainful offences					
with violence	15.3	22.6	18.7	9.8	18.2
Malicious offences					
against property	0.9	1.9	1.9	1.6	3.2
Theft	42.7	46.3	45.3	30.8	38.8
Fraudulent offences	5.7	7.4	13.0	29.9	9.0
Motor-vehicle offences	1.1	0.6	0.8	2.4	3.9
Other	4.7	5.2	4.9	6.4	4.2
Number	424	18,533	14,412	499	4,811

In Canada, as in other industrialized nations, the crime rate is highest among young people and decreases markedly with age. In 1966 the rate of indictable offenders was 1,032 (per 100,000) among 16- and 17-year olds, but only about 90 among those 50 to 59 years of age.⁽²⁵⁾ This suggests that increases in crime rates may be due to increases in the proportion of young people in the population as a whole.

When the changes in crime rates are broken down by age and sex (Table 9), we find that male rates have increased in the age groupings up to 25 years but have declined beyond this age. The rate for males 16 to 17 years of age increased by 47% between 1950 and 1966, while the rate for males 35 to 39 years of age declined by 33%. The female rate on the other hand has increased in all age classes, the magnitude of the increase showing no relation to age. The largest increase in rates (175%) appears in the age grouping 60 years and over⁽²⁶⁾, and the lowest (48%) in the age class 45 to 49 years.

TABLE 9⁽²⁶⁾

Persons Convicted of Indictable Offences by Sex for Selected Age Groups, 1966
Rate per 100,000 Population

Offence Class.....	Age Groups			
	16-17	18-19	35-39	40-44
Males				
Against the Person.....	100	209	80	68
Against Property with Violence.....	593	443	37	24
Against Property without Violence.....	1,032	910	188	162
Malicious Offences against Property.....	60	57	8	6
Other Criminal Code.....	75	119	48	37
Other Federal Statutes.....	1	6	5	3
Females				
Against the Person.....	4	7	5	6
Against Property with Violence.....	15	8	1	1
Against Property without Violence.....	144	144	59	46
Malicious Offences against Property.....	1	3	1	--
Other Criminal Code.....	7	12	4	4
Other Federal Statutes.....	1	3	1	--

It should be noted that the great majority of indictable convictions at all ages are for non-violent offences and that this proportion of the whole has been increasing.

Race and economic class are the last two and potentially most important categories in the construction of a profile for a Social Report because they will likely be the most significant social indicators of relative deprivation contributing to criminality. Unfortunately, these are the categories least documented in Canada. In the U.S. the crime rate for non-whites is several times that for whites,⁽²⁷⁾ and victimization is roughly 50% higher for non-whites than for whites⁽⁴⁾.

One of the few significant sets of data available lists the numbers of Indian and Métis women admitted and detained in prison in 1965 or 1966 (Table 10). When one realizes what a small percentage of the total population is of Indian origin the magnitude of the social problem comes into sharp and shocking focus.

TABLE 10⁽²⁸⁾

Number of Indian and Métis Women in Selected Prisons for Women in Canada for Certain Periods in 1965 or 1966

Institution	Period	Total Admitted ^a	Total in Detention ^b	Indian or Métis	Per cent Indian or Métis
Kenora District Jail, Ontario	Jan--June 66	281		266	95
The Pas Correctional Institution for Women, Manitoba	August 66		17	17	100
Portage La Prairie Correctional Institution for Women, Manitoba	August 66		63	44	69
Riverside Correctional Centre, Saskatchewan	August 66	30		24	80
Fort Saskatchewan Provincial Gaol (Women's Section), Alberta	August 66	109		81	74
Oakalla Prison Farm (Women's Gaol), British Columbia	April 66	76		35	46

^aTotal number admitted during period of time indicated

^bRetained in jail at the time of the collection of data

Badly needed is data on the incidence of crime among the disadvantaged, in both the inner city and at the frontier, and on the fate of the convicted among such groups. Law enforcement officers should be required to compile figures on race and income, as is now done for education, age and residency. The matching of crime rates to opportunities and conditions is essential to the objective measurement of public order and progress within society as a whole.

Like figures should be tabulated for the victims of crime. While it is commonplace knowledge that (in Canada and the U.S.) the poor commit most of the crime, it is not appreciated that in the U.S., the poor are also most often the victims.⁽⁴⁾ To our knowledge no such hypothesis for Canada has yet been tested. If it is true in Canada as in the U.S. then the cries of the articulate public for more money for law enforcement are doubly misplaced as public priorities. Firstly, it is not those who raise the hue and cry of "law and order" who are the actual victims and secondly, the solutions for the actual victims lie in another direction entirely; betterment of their socio-economic position.

2.3 The Law Enforcement Officers

The relative number of people and institutions involved in the agencies of restraint and confinement is some sort of indicator of social progress and equity. It is unfortunately not at this point clear whether there is a positive or negative correlation; whether indeed repression is a cause or an effect. Since this is a little explored arena, what follows will be largely an attempt to argue for analysis and understanding.

This section of our report is perhaps the least documented of all, partly because there is a dearth of statistical and analytical data and partly because our resources did not allow a proper research of the arena. The following few paragraphs will accordingly be based on personal readings and observations of the Canadian scene over a period of some thirty-five years. The purpose here is not to make a factual point or two but to draw attention to a set of problem areas. Should the result of future research prove our propositions to be right or wrong, our present purposes will be equally well served.

We share the conviction of the majority that in a complex society a strong on-the-street constabulary for the public and the individual welfare are essential. With such an important function, and the exceptional powers vested in the police, they should be given the financial and intellectual resources to carry out their job. To the extent that they fulfil their charge they should be accorded a degree of respect and support commensurate with the great importance of the job.

Although legend may have it otherwise, the North-West Mounted Police never had the swashbuckling character of the Texas Rangers. There was too much of the British "bobby" in them. Most of their successors in the R. C. M. P. and in the provincial and the city forces of Canada have retained a relatively moderate mein. Granted that their record during the Great Depression against the hunger strikers in Vancouver and Winnipeg and at the frontier against the native peoples has besmirched their reputations, their day-to-day performance as dispassionate defenders of public and individual interests is, by global standards, good. Despite the painful labour-management, racial, religious and language conflicts which have beset us from time to time, the number of Canadians who have been killed or injured in industrial or civil strife with the authorities is negligible. Indeed, the total seems even to be less than would be expected

from the number of psychopathic persons who would by chance be involved on either side of the law.

Granting all this, the police gain their authority, their direction and their societal values from the local or regional establishment. There is accordingly no uniform code of behaviour for the various civil and provincial contingents. The Quebec Provincial Police, inheriting an ethic from a corrupt, union-busting era have proven to be an ineffective agency, sustaining little respect from the citizens. The situation with the Montreal Police Department is comparable. The Vancouver Police Department, under the direction of a hawkish mayor is in perpetual conflict with the youth culture and the disadvantaged. This conflict led to the Gastown riots, and ultimately through public reaction, to impeachment of the Department. This is simply a microcosm of the destructive confrontations which have repeatedly developed between Los Angeles Mayor Yorty's police department and the disadvantaged of that city. On the other hand, Toronto, the capital of Ontario which is currently Canada's melting pot of religions, races, philosophies and cultures, the centre of the youth culture, of rock and folk festivals, of the drug culture, and of the most militant groups of students, young immigrants and the poor, has been regularly beset by the most diverse and potentially dangerous confrontations. Yet not a single one of these has led to a public disorder which may be classed as serious. Is this circumstance a matter of luck, or is it because the city fathers, the establishment, the press and the police through osmosis (Chief Adamson is recognized publicly as a dove), recognize that dissent and conflict are essential elements of a vital, progressive community, and thus, like individuals and property, deserve police understanding and even protection? We optimistically opt for the latter interpretation.

A social reporting of law enforcement activities based on carefully collected data and analyzed in relation to the full spectrum of socio-economic factors could not only be informative from the point-of-view of cost effectiveness

but it could lead ultimately to norms of optimum police performance and utility. Compilation of the following data on a comparative city, provincial, federal and international basis would appear essential to such an analysis: number of police per capita, their age distribution, number of police in relation to the crime rate, incidence of arrest of various socio-economic groups in various classifications, public attitudes towards police activity, salaries and educational levels of police in relation to other comparable professions and the components of police education.

2.4 The Courts

We have a proclaimed self-image as a "just society". However, the quality of Canadian justice needs to be specified to be understood.

In pursuing an understanding of the character of Canadian justice, one is struck by the power and potential arbitrariness of its mechanisms and rules. In particular, law enforcement officers and the judiciary have unusual latitude for discriminatory application of their powers. For instance, police in Canada, unlike those in the United States, have the power to determine when after arrest and before or after interrogation, a person has the right to see counsel. A recent pressreport from the Canadian Civil Liberties Association claims that 30% of persons taken into custody are refused permission to make phone calls at the time of their arrest. Evidence illegally obtained is admissible in a Canadian court of law. Judges have wide areas of discretion. The Criminal Code sets very high maximum sentences for offences and relatively low or no minimums, giving the judges discretion to specify the duration of the penalty. In selection of a jury, the panel list only goes to the defence counsel six days before the hearing, allowing little time for research; in the hearing, a candidate cannot be interrogated without demonstrated cause.

All the above points stand out in contrast to American practice and serve as a background for the following statistics (Tables 11 and 12) which demonstrate an exceptionally high incidence of conviction:

TABLE 11⁽²⁹⁾

TRIALS OF CHARGES OF INDICTABLE OFFENCES				
<i>Method of Trial</i>	<i>Tried</i>	<i>Acquitted</i>	<i>Convicted</i>	<i>Other Disposition</i>
Judge and jury	939	256	618	65
Judge alone	2,651	631	1,996	24
Magistrate, consent jurisdiction	20,756	1,581	19,057	118
Magistrate, absolute jurisdiction	18,815	1,705	17,008	102
Totals	43,161	4,173	38,679	309

TABLE 12⁽³⁰⁾

PERSONS TRIED ON CHARGES OF INDICTABLE OFFENCES
IN ONTARIO IN 1961

<i>Method of Trial</i>	<i>Number Tried</i>	<i>Percentage of Total Number Tried in Canada</i>
Judge and jury	452	47.0
Judge alone	371	13.6
Magistrate, consent jurisdiction	8,642	35.2
Magistrate, absolute jurisdiction	6,733	41.1
Total number tried	16,198	37.5

Within the context of this high rate of conviction, however, there are changing and moderating patterns of sentencing. Our data summary is abstracted from reference (31).

The tendency to use probation as a form of sentencing has increased since about 1958 (12.5% of sentences in that year but 18.7% in 1966) and the proportion of jail sentences has declined slightly since the early 1950s (38.1% of sentences in 1950 compared to 29.7% in 1966).

A change in the pattern of sentencing for theft is clearly discernible. Starting in 1955, the proportion of offenders sent to jail has tended to decline and the proportion given a fine have increased. The courts sent 44.5% to jail in 1954, 25.0% in 1966. In the same years, the courts fined 18.7% and 33.3%. The proportion sent to penitentiary has declined from 4.8% in 1955 to 1.9% in 1966. The other sentencing choices for theft show no marked change.

The notable change in sentences for breaking and entering has been the increased use of probation. Whereas in 1950 only 9.2% of persons convicted of this offence were put on probation, in 1966 the proportion was 30.4%. This has meant a decline in the incidence of all types of incarceration - jail, reformatory and training school, and penitentiary.

The only trend that emerges in respect to sentencing for robbery and extortion is an increase in proportion put on probation from 3.4% in 1950 to 12.0% in 1966. The great majority of these offenders (82.6% in 1966) are still sent to prison.

Sentencing for manslaughter shows a clear pattern of increasing severity after 1956. This may be due in part to changes in the Criminal Code which made it possible to charge motorists with criminal negligence in the operation of a motor vehicle instead of manslaughter, thus removing from the population under sentence some of the persons most likely to be dealt with leniently. It is also noteworthy that 10.7% of the guilty were fined in 1960, but none in most years since 1956.

Sentencing for rape shows no consistent pattern. The only element

of stability is that in most years all or most of the offenders have been sent to prison, but the length of sentences has fluctuated widely.⁽³²⁾ For example, in 1957 penitentiary sentences of 2 to 5 years were given to 17.8% of the offenders, while in 1964 sentences in this range were given to 40.3% of the offenders. The degree of fluctuation may be attributed to the fact that rape convictions are so infrequent (ranging from 27 to 74 per year in the period under survey) that a change of a few sentences in any category is enough to alter greatly the percentages.

Overall, there is a tendency to use alternatives to imprisonment more frequently for the major property offences. This pattern doesn't hold for the two aforementioned kinds of offence against person, and indeed the latter tend to share the reverse pattern.

"Rehabilitation" rather than "deterrence" is now taken to be the first priority in sentencing in Canada, and the notion of rehabilitation itself has tended to shift away from occupational training toward psychiatric consultation or confinement. Whether the latter shift represents a major progressive move must await accumulation of statistics on the social results. However, it should be noted and emphasized that all those under mandatory psychiatric treatment, or actually admitted into mental institutions, are to be numbered as among those confined, and so the gross number of the confined remains a telling social indicator of stability and public order in our society.

2.5 Corporate Misdemeanour

Throughout most of the history of Western Civilization the wide acceptance and the legitimization of strong forms of entrepreneurship have kept corporate entities outside the pale of ethical restraint. Indeed, the Ten Commandments speak only to the behaviour of individuals. Predatory wars, piracy, the slave trade have all sustained wide legitimacy, and in some places do so even to the present day. Since the height of the industrial revolution

and the heyday of "laissez-faire" capitalism social forces and unionization have tended to limit the range of excesses against individuals and the long range public weal. Yet our persistent belief in the ethic of growth and progress continues to abet a kid glove policy on the part of both socialist and capitalist governments towards certain unethical practices of entrepreneurs, explorers, and those essential vehicles of growth, industry and their associated corporate entities. Industrial pollution, for example, has been recognized only recently as an arena for strong regulation and penalization of miscreants. Allowable practices such as tax avoidance and declaration of bankruptcy fall into the same category.

That governments in Canada as a whole remain soft on industry with respect to pollution and desecration of the environment is evident from the abridged summary of legislation in the books at Ottawa and in the provinces given in Table 13 . With few exceptions, the penalties for environmental misdemeanours can in no way be regarded as deterrents to the actions of large corporations. The full table, and public perceptions as seen through the press, suggest that the Province of Quebec is particularly remiss in this respect.

There are encouraging signs, particularly in Ontario, that activities in the regulatory, inspection and monitoring arena are in a strong upswing and that the government is capable of taking a tough line in particular instances. It is essential, however, that a heresay statement such as the foregoing should be documented through an ongoing program of research and social reporting. We will have more to say on environmental problems in the following chapter.

We can sympathize with governments in their hesitant approach to the rationalization of the negative and positive features of entrepreneurship, for while the latter can be reasonably well-supported through experience and

DEPARTMNT	AGENCY/BRANCH	ACTS ADMINISTERED	RELEVANT CLAUSES	BEARING ON EQM	KEY PROVISIONS
Fisheries and Forestry		Fisheries Act R. S. C. 1952, C. 119	S. 36; S. 37, S. 45 S. 33, 34, 37 S. 60, 61	Investigation Regulation Penalties	Prohibition of effluent discharge deleterious to fish Fine and/or imprisonment, \$20-100 Up to 2 months for continuing offences
		Amended S. C. 1960-61 C. 23	S. 4 (5) S. 9	Increased Penalties Sections 60 and 61 repealed	\$100-\$1000, 1-12 months for continuing offences
	Indian Affairs and Northern Development	Canadian Wildlife Service	Migratory Birds Convention Act R. S. C. 1952, C. 179	S. 4 S. 12	Regulation Penalties	Prohibition of discharge into waters of substances harmful to migratory waterfowl Up to $300 and/or up to 6 months
Transport	Marine Regulations Branch	Canada Shipping Act R. S. C. 1952, C. 29, Amended S. C. 1960-61 C. 32	S. 28 (S. 495A) and S. 39 (S. 495B)	Regulation Penalties	To prevent pollution by oil from ships of any inland minor or other Canadian waters. Up to \$500 and/or 6 months
		Navigable Waters Protection Act, R. S. C. 1952, C. 193	S. 19; S. 20	Regulation	To prevent discharge of rubbish or other materials into navigable waters of less than specified depth. \$20-\$300
			S. 27	Penalty	
FEDERAL LEGISLATION PERTAINING TO PESTICIDE MANAGEMENT					
Fisheries and Forestry		Fisheries Act R. S. C. 1952, C. 119	S. 60, S. 61 S. 33, 34, 37	Regulation and Penalty	Fine \$20-\$100, and/or up to 2 months for discharge deleterious to fish
		Amended S. C. 1960-61, C. 23	S. 9 S. 4	Abolishes 60 and 61, SUPRA Regulation and Penalty	Governor-in-Council to have power to deem substances deleterious; penalties increased Up to \$1000 for continuing offences and 12 months
					37

DEPARTMENT	AGENCY/BRANCH	ACTS ADMINISTERED	RELEVANT CLAUSES	BEARING ON EQM	KEY PROVISIONS
Indian Affairs and Northern Development	Canadian Wildlife Service	Migratory Birds Convention Act R. S. C. 1952, C. 179	S. 4	Regulation	Prohibition of discharging into water of substances harmful to migratory waterfowl
			S. 12	Penalty	Up to \$300 and/or up to 6 months

FEDERAL LEGISLATION PERTAINING TO AIR QUALITY MANAGEMENT

Transport	Marine Regulations Branch	Canada Shipping Act S. C. 1960-61, C. 32	S. 28	Regulation	To prevent pollution of water and air by ships
			S. 39	Penalty	Up to \$500 and/or 6 months

FEDERAL LEGISLATION PERTAINING TO SOUND LEVEL CONTROL

Transport	Civil Aviation Branch	Aeronautics Act R. S. C. 1952, C. 3	S. 3, S. 4(1) (d), (i)	Regulation	General control over conditions under which aircraft may be operated.
			S. 4 (3)	Penalty	Up to \$1000 and/or 6 months.

PROVINCIAL WATER POLLUTION LEGISLATION

PROVINCE	DEPARTMENT	AGENCY/ BRANCH	ACTS ADMINISTERED	RELEVANT CLAUSES	BEARING ON EQM	KEY PROVISIONS
British Columbia	Lands, Forests and Water Resources	Pollution Control Board	Pollution Control Act, S. B. C. 1967, C. 34; S. B. C. 1968, C. 38	S. 4(b); S. 5	Regulation	Permit required before waste may be discharged.
				S. 4 (c)	Research	Technical Committee to advise Board of noteworthy developments.
				S. 20A	Penalty	Up to \$1000 and/or 3 months. Up to \$500 per day for continuing offences.

PROVINCE	DEPARTMENT	AGENCY/ BRANCH	ACT ADMINISTERED	RELEVANT CLAUSES	BEARING ON EQM	KEY PROVISIONS
Nova Scotia	Trade and Industry	Nova Scotia Water Authority	The Water Act, R.S.N.S. 1964, C. 335	S. 16	Regulation	No person or body to discharge in, on, or near water anything that "may cause pollution or impair the quality of water for beneficial use". Up to \$100 per day and/or 6 months for individuals. Up to \$500 per day for corporations.
Ontario		Ontario Water Resources Commission	Ontario Water Resources Commission Act, S.O. 1956	S. 26	Regulation and Inspection	Supervision and examination from time to time of all waters used as a source of supply. Up to \$1000 and up to one year. Supervision of maritime sewage discharge. Up to \$500.
				S. 27	Penalty	
				S. 47	Regulation	
Quebec	Municipal Affairs	Quebec Water Board	Water Board Act, R.S.Q. 1964,		Penalty	
				S. 16	Regulation	To regulate all aspects of water pollution.
				S. 14	Research and Regulation	Board may research, inspect and compel a municipality or corporation to take adequate anti-pollution steps.
				S. 17	Regulation	Permit required to discharge sewage.
				S. 16	Regulation	Cutting and storing of ice.

PROVINCE	DEPARTMENT	AGENCY/ BRANCH	ACT ADMINISTERED	RELEVANT CLAUSES	BEARING ON EQM	KEY PROVISIONS
Quebec Cont'd.				S. 27	Penalty	Up to \$500 and \$25 per day for continuing offences.
Saskatchewan	Natural Resources	Water Pollution Control Branch of the Saskat- chewan Water Resources Com.	Water Resources Com. Act, R. S. S. 1965, C. 361	S. 34 S. 35 S. 51	Supervision, Control, Regulation Investigation Penalty	Waterworks, sewage and pollution control all under SWRC. Up to \$5000 or \$500 per day for continuing offences.

PROVINCIAL LEGISLATION PERTAINING TO AIR QUALITY MANAGEMENT

British Columbia	Health Services and Hospital Insurance	Pollution Control Board	Pollution Control Act, S. B. C. 1967, C. 34	S. 3 S. 20A	Regulation Penalty	Board to be responsible for regulation of land, water and air pollution. Up to \$500 per day for continuing offences and/or 3 months.
Ontario	Health	Air Pollution Control Service	Air Pollution Control Act, O. R. 449/67, S. O. 1967, C. 2	S. 2, f. f. S. 2 S. 16 S. 2(6)	Definition Research Regulation Penalty Financial Assistance	Identification of prohibited emissions and quantities. Overall control of air pollution sources. Individuals up to \$2000; corporations up to \$10,000 for multiple convictions. Power to make grants to universities or municipalities.

PROVINCE	DEPARTMENT	AGENCY/ BRANCH	ACT ADMINISTERED	RELEVANT CLAUSES	BEARING ON EQM	KEY PROVISIONS
Quebec	Health	Sanitary Eng. Service	Public Health Act, R. S. Q. 1964, C. 161	S. 99 S. 116, S. 117 S. 16	Regulation Penalty Regulation	Air within industrial establishments. Up to \$50 or 14 days. General authority to insure existence of conditions conducive to good health.
Saskatchewan	Public Health	Occupational Health Branch, Air Pollution Control Division	Air Pollution Control Act, R. S. S. 1965, C. 267	S. 3 S. 7 f. f. S. 10 S. 14	Regulation Regulation Investigation and Research Penalty	General overall control of air pollution. Co-operation with municipalities, powers of municipalities. Air pollution advisory committee established. Up to \$25 for individuals; up to \$500 for corporations, per day for continuing offences.

PROVINCIAL LEGISLATION PERTAINING TO PESTICIDE MANAGEMENT

British Columbia	Lands and Forests		Water Act, R. S. B. C. 1948, C. 361	S. 37(R) S. 37 S. 44	Regulation Penalty Saving, Clause	Prohibition of dumping of specific substances. Up to \$250 or 12 months. Power to make special agreements with pulp and paper manufacturers
Ontario	Health		The Pesticides Act, S. O. 1967, C. 74	S. 2, S. 13 S. 14	Regulation Penalty	Professional sprayer must be qualified; certain pesticides prohibited. Up to \$1000 and/or up to 3 months.

documentation (see Chapter 7), the former cannot. We simply do not know, for example, the social costs of environmental depredation and of the billions of dollars deflected from the public purse by tax avoidance practices (see however, reference (34)). Equally seriously, the policy-makers do not know how to regulate commerce and industry so as to optimize the social good, and thus understandably opt for regulatory restraint in the hopes that public opinion and the free market forces will do the job for them. Until measures of costs, benefits and economic response are developed and a sustained information bank is operative, governments are not likely to approach the problems of vetting corporate responsibility in a vigorous, rational and completely equitable manner.

2.6 Overview

Of all society's stabilization and custodial practices law enforcement and imprisonment are recognized to be the most costly per individual⁽³⁵⁾ and at the same time to offer the least long-term returns. While it may appear to be a benefit, indeed an essential, that proven felons be incarcerated and that officers be stationed throughout the community in sufficient density to deter prospective felons, this kind of stability is at best an uneasy state. It is not only an uneasy state, but it is an inequitable one, for the brighter felons working within the confines of an imperfect legal system, go scot-free.

As recent Hungarian, Czech, French, Irish and American disturbances have indicated, with seemingly benign changes in the ethos of the society, conventional law enforcement and repression have led not to stability but to an escalation of disorder, to rampant vandalism and insurrection.

While we wholeheartedly recommend monitoring and reporting on progress in the present system and on the preventive and ameliorative measures currently being undertaken and expanded, we nonetheless sustain a strong conviction that the main thrust towards stabilization must be focussed on the other elements of

the social ledger described in the following chapters.

Man, after all, shares the internal conflicts of all his institutions and social devices (or should we express it inversely). He is at one and the same time moderate and predatory. The legislator and the social planner must accept this dichotomy as an empirical fact of human nature and direct his efforts towards the attainment of a societal activity balance which gives adequate play to both characteristics.

3. OUR PHYSICAL ENVIRONMENT

3.1 Introduction - The Ecological Framework

Despite the current wave of interest in problems of the environment we have yet to define our ideals and our goals and to elucidate an incisive set of policy questions. Indeed, in a stratified society such as ours, it may be impossible to define an ideal which can be shared by all strata. Unpolluted urban or conserved natural environments are by- and- large ideals of the middle and upper economic classes. Such ideals, and the policy questions associated with them will become universal only as the more compelling material inequities are removed.

For the purposes of this section of the report, the physical environment is regarded as having two major components. The first of these, and the one to which we devote our main attention, is the portion of our surroundings which is traditionally regarded as in the public domain, that is, air, water, soil and the city or countryside as a whole. The principal characteristics of these environments, as conventionally interpreted, is that if one person enjoys them, another person is not deprived of them. From the socio-economic point of view they have been regarded as "free" resources. A rather arbitrary line has been drawn between the above broad category and certain specific man-made environments such as housing, urban space and transportation and the provision for urban, suburban or remote parks and recreational facilities in the form of libraries and theatres, for example. These man-made environments cannot be unequivocally considered as "free" so there exists a tendency not to classify them as a public good. Furthermore there appears to be a built-in inequity in the distribution of benefits derived from this type of public investment. The problems that relate to this latter area of our environment stem from a different source than the first group so they must be dealt with separately.

The traditional way of looking at man in relation to his natural surroundings has been to consider him as a creature standing apart from nature and acting upon

it. This perception which has roots in the Judeo-Christian religion, is deeply entrenched in various institutional, legal and social concepts of our country. "Both our present science and our present technology are so tinctured with orthodox Christian arrogance toward nature that no solution of our ecologic crisis can be expected from them alone."⁽³⁶⁾

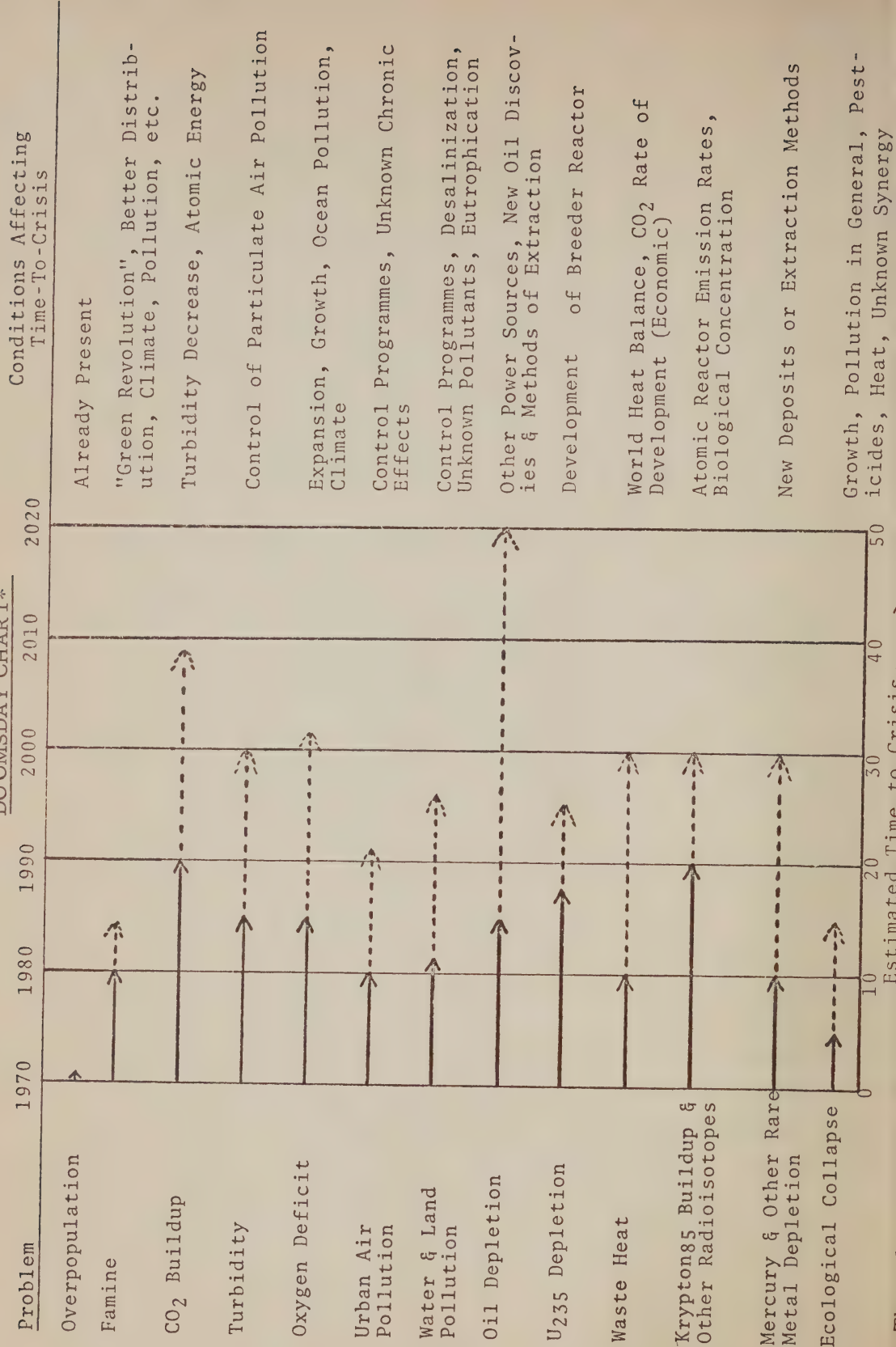
The other view, and one which is gaining ascendancy, is to place man as an element of the earth's life-cycle, or to use the fashionable jargon: man is a part of the biosphere. Despite the fact that humans have a remarkable ability to develop tolerance to conditions extremely different from those under which they evolved, it remains that "man can adapt biologically to the technological environment only insofar as mechanisms of adaptation are potentially present in his genetic code".⁽³⁷⁾

The average quality of life for species within the ecological cycle has without doubt decreased. The number of species is diminishing, the quantity of various objectionable matters is increasing, and there exists a potential of doomsday or actual extinction of some or all forms of life on the Planet Earth. Table 14 summarizes what many ecologists would regard as a conservative prognostication of the world environmental crisis⁽³⁸⁾. Some scientists regard the recent natural and unnatural disasters in the Bay of Bengal and in mainland Bangla Desh as explicit evidence of the onset of the predicted crises.

All materials entering the processes of production and consumption (except those which become permanent capital) ultimately become waste. While the biosphere has an inherent capacity for recycling substantial amounts of certain wastes, there exists ample evidence that this capacity is finite. Pollution abatement is almost irrelevant within a global concept since, in effect, it transforms one type of waste into another of a more or less acceptable form, but which in the long run must be still accounted in the overall materials balance. Although the global model oversimplifies a number of parameters, predictions of an eco-catastrophe are entirely credible barring drastic changes in the universal value systems of civilization.

TABLE 14

DOOMS DAY CHART*



Despite the harbingers of doom within the Western intelligentsia and the credibility of their thesis, the leaders of the emerging economies of the world are not impressed. At the recent meeting of the International Organization of Consumer's Unions, the president of the Association from Malaysia commented that "some of us would rather see smoke coming out of a factory and men employed than no factory at all" while his counterpart from India is quoted as saying that "the wealthy countries worry about car fumes. We worry about starvation." (39)

These poignant observations serve to highlight the basic dichotomy of objectives within any society - the unavoidable, indeed necessary conflict between progress and conservation. Rational planning at both the national and international level must give balanced attention to these essential elements of social evolution.

If we narrow our examination to Canada or to Ontario and to our achievements to date we obtain a much more positive picture. We are inclined to the view that there is not much to be said for pre-industrial or industrial society, contrary to some nostalgic inclinations towards a return to the noble-savage condition. Lack of material wealth, long working hours and unsanitary conditions in the immediate vicinity of settlements abetted a situation where only a small sector of the population enjoyed the unspoiled environment.

Swimming in a clean lake and appreciation of the natural beauty of a pastoral scene become significant public benefits only when the public gains access to them. Recent years have marked an increase in the material wealth of the citizenry due to a steady growth in the size of the economy and to social policies which assure a more equitable distribution of goods and services. While there still exists a sizable portion of the population lacking the basic requirements of food and shelter, an increasing percentage of our people dispose of sufficient time and money to allow them to seek environmental

gratification. At the same time we have been blessed with a physically large country, with immense reserves of fresh pure water, with forests, fields and unspoiled open spaces. Indeed, having started out with a substantial environmental credit note, we have been able, and may continue for some time to come to have our cake and eat it too. Within this narrow context we may be led to complacency as regards both progress and the environment.

Yet it is becoming increasingly apparent that our credit note is running out, that progress in the form of industrial and urban expansion is increasingly producing societal disutilities which in many cases overbalance the direct material benefits. Air pollution is killing people by the thousands in the major population and industrial concentrations of the West, as Table 15 indicates, and recreational water pollution is substantially reducing both the commercial and recreational benefits associated with our rivers and lakes. Governments are of course aware of the problems and are beginning to take action whenever public opinion, political expediency and perceived priorities allow. An annual report on progress, as a chapter in a comprehensive social report, is an essential part of a continuing program of public, corporate and legislative education in preparation for further advance.

TABLE 15⁽³⁸⁾

AIR POLLUTION DISASTERS

Date	Place	Attributed Mortality
February, 1880	London, England	1,000
December, 1930	Meuse Valley, Belgium	63
October, 1948	Donora, Pennsylvania	60
November, 1950	Poza Rica, Mexico	22
December, 1952	London, England	4,000
January, 1956	London, England	1,000
December, 1957	London, England	700-800
December, 1962	London, England	700

We do not number ourselves among those who see a collapse of the human environment just around the corner, not because we doubt the scientific basis of prognostications such as given in Table 14 , but because we see all human societies as adaptive in the face of extremity. London, England, is cleaning up its atmosphere, and the Thames river as well. Air pollution in North America due to the automobile will be substantially reduced in the near future due to legislation and technological advances. In the extreme, ecologists have interpreted the Bengali disasters as nature's method of population control, for there are many close analogues in the world of biology. There will undoubtedly be many more, and worse disasters, but the sum total of all such disasters will not add up to doomsday . Call it cynical optimism, if you will, but there is no reason why man, like all the other viable species during biological evolution, should not be capable of achieving a dynamic accommodation to his total environment.

Optimism must not, of course, be interpreted as lack of concern, particularly as regards the more serious global prognostications. The quality of our own environment and well-being is in the long run inextricably intertwined with the quality of life of all the peoples of the world. An important indicator of our progress in national environment matters will always be the measure of our involvement in, and resources devoted to, the solution of global environmental problems.

3.2 Man-Made Environments

We deal here only briefly and generally with an arena of welfare economics for which quantification is almost completely lacking. It concerns those special environments which man has created in pursuit of personal comfort, mobility and recreation. By the nature of our economy, these tend to be private or semi-private goods and so the distribution of benefits from them is often related to economic classes. Examples are housing, transportation

services and the provincial and national park systems. By and large public subsidies in these areas tend to be regressive; the well-to-do tend to benefit proportionately more than do the poor. Urban renewal may be a case in point. Destruction of slums and the dislocation of viable communities within them in search of the city beautiful, and their replacement with high rise buildings at a higher unit rental cost has been known to force the underprivileged to seek other slums under conditions of even greater overcrowding.

While bus and subway services may well be regarded as socially neutral, subsidized commuter services such as Go-Transit often favour the well-to-do suburbanite. While the expansion of the national park system and wilderness areas attracts wide public support, they are only of benefit to those who can get there, who have automobiles or the price of air fare and long vacations. Such expansion, accelerated by outcries from the press and the affluent vocal segment of the populace, may often lead to serious disutilities to the poor, e.g., the woodsmen of the areas affected. The designation of Quetico park as a wilderness area, for example, puts many lumbermen out of a job and provides benefits primarily for American tourists. The foregoing is not meant to imply a negative attitude towards conservation, but to draw attention to the conflicts of interest which arise in the arena of social planning. We believe that diverse interests will be reconciled to the extent that the legislators and their planners are provided with adequate measures of social costs and benefits, of disutility and utility, over the entire spectrum of social welfare activity. The legislators and the public have the right to be informed as to the economic and social difference, if any, between the actions of the unemployed youth who sustains a satisfactory life-style on the dole, the sports fisherman who regularly flies into the well-stocked lakes of northern Ontario and the resort owner who survives only because of the subsidy provided through fish-stocking. Such perceptions can only come from analyses such as that in Table 16 which estimates U.S. wealth redistribution associated with all environmental quality expenditures⁽⁴⁰⁾ and comparable analyses in the other parts of the social arena.

TABLE 16⁽⁴⁰⁾
Wealth Redistribution Due to Environmental Quality Expenditures

	Percent <i>paid</i> of taxes, 1966	Percent <i>received</i> as beneficiaries of environment, 1968	Percent of <i>population</i>
Poor	8	28	45
Middle	52	44	45
Rich	40	28	10

3.3 An Inventory of Canadian Environmental Problems*

The sources of pollution can be broadly categorized as economic and demographic growth, urbanization, technological change and industrialization. The resulting environmental deterioration can be classified as follows:

1. Air, Water and Soil quality
2. Chemicals pollution
 - a. Biocides
 - b. Fertilizers
 - c. Radioactive wastes
 - d. Preservatives
3. The Quality of the Rural Countryside
4. The Quality of the Physical Aspects of the Urban Environment

The economic and social consequences of deterioration are equally important and these are also classified as:

1. Ecological and Human Health effects
 - a. Resource Implications
 - b. The Life Supporting capacity of the Environment
 - c. Biological Effects
2. Aesthetic effects
3. Economic effects

*This section trades heavily on the Systems Research Group, Environmental Quality Management Working Papers nos. 11 and 12. (41, 42)

Although city dwellers already have strong perceptions about the current state of deterioration of the environment there is as yet an insufficient network for monitoring emissions to allow a quantitative discussion of the problem in Canada. Tables 17 and 18 show the result of a predictive simulation carried out by the Systems Research Group (SRG) based on modified American data. While the prognostication is undoubtedly inaccurate, we cannot escape the conclusion that urban and industrial expansion continued at current rates, with all the ameliorative efforts that can be marshalled in the meantime, will lead to pollution problems of crisis proportions. Within this broad perspective it is apparent that our legislators and planners will have to look beyond the pollution consequences and their amelioration towards the basic causes stemming from the trend towards urbanization and industrialization. Furthermore, the projection serves to indicate, without qualification, that the main sources of residual wastes are private automobile transportation, public transportation, domestic-industrial heating, power generation, pulp and paper production, municipal sewage and domestic solid waste production.

While it is apparent that the main problems of the future will center around the main population centers, Vancouver, Montreal and the "Golden Horseshoe" of Ontario, none of the Provinces or the Territories can be complacent about the future. Following is an abridgement of the SRG appraisal of the cross-Canada situation. For most regions, municipal sewage is listed as one of the main sources of water pollution. Some 40% of municipal sewage receives no treatment, while the balance receives primary, lagoon or secondary treatment. None of these eliminate all harmful pollutants.

BRITISH COLUMBIA

In British Columbia, the major sources of pollution are surface mining operations, the pulp and paper industry and domestic sewage. Vancouver is beset by both air and water pollution. Domestic and industrial sewage pollute

TABLE 17

QUANTITIES (TONS) OF WASTES PRODUCED IN CANADA

Description of Wastes	1966	1980	2000	Factor of Increase 1966-2000
CO (Carbon Monoxide)	6.776x10 ⁶	1.204x10 ⁷	2.234x10 ⁷	3.3
CO ₂ (Carbon Dioxide)	2.236x10 ⁸	3.881x10 ⁸	7.323x10 ⁸	3.3
SO ₂ + SO ₃ (Sulphur Oxides)	2.427x10 ⁶	4.090x10 ⁶	7.737x10 ⁶	3.2
Hydrocarbons	6.818x10 ⁵	1.190x10 ⁶	7.241x10 ⁶	3.3
Nitrogen Oxides	8.547x10 ⁵	1.670x10 ⁶	3.444x10 ⁶	4.0
Particulate Matter	4.541x10 ⁵	9.169x10 ⁵	2.008x10 ⁶	4.4
Biological Oxygen Demand	2.387x10 ⁶	2.991x10 ⁶	4.071x10 ⁶	1.5
Phosphates	8.006x10 ³	9.988x10 ³	1.336x10 ⁴	1.7
Nitrogenous Matter	1.201x10 ⁵	1.498x10 ⁵	2.005x10 ⁵	1.7
Suspended Solids	3.132x10 ⁵	4.239x10 ⁵	6.183x10 ⁵	2.0
Dissolved Solids	3.860x10 ⁶	4.904x10 ⁶	6.860x10 ⁶	1.8
Solid Wastes	1.352x10 ⁷	1.686x10 ⁷	2.256x10 ⁷	1.7
Other Organics	5.110x10 ⁴	9.316x10 ⁴	1.951x10 ⁵	3.8

TABLE 18

PRODUCTION LEVELS OF WASTE GENERATING ACTIVITIES IN CANADA

TONS OF EMISSION PER ANNUM

Activity	1966	1980	2000	Factor of Increase 1966-2000
Electrical Energy - Coal	1.948x10 ⁴	7.322x10 ⁴	1.502x10 ⁵	7.7
Electrical Energy - Natural Gas	3.596x10 ³	1.086x10 ⁴	2.125x10 ⁴	5.9
Electrical Energy - Oil	3.728x10 ³	1.279x10 ⁴	2.575x10 ⁴	6.9
Electrical Energy - Hydro	1.317x10 ⁵	2.194x10 ⁵	3.448x10 ⁵	2.6
Industrial Heating - Coal	1.323x10 ⁴	1.420x10 ⁴	1.167x10 ⁴	0.9
Industrial Heating - Natural Gas	2.281x10 ²	7.667x10 ²	1.536x10 ³	6.7
Industrial Heating - Oil	5.509x10 ⁴	9.534x10 ⁴	2.125x10 ⁵	3.8
Domestic Heating - Coal	2.800x10 ³	4.510x10 ²	-	-
Domestic Heating - Natural Gas	3.311x10 ²	6.464x10 ⁵	1.610x10 ⁵	4.9
Domestic Heating - Oil	1.256x10 ⁵	1.493x10 ⁵	1.763x10 ⁵	1.4
Private Automobile - Gasoline	9.875x10 ⁴	1.737x10 ⁵	2.808x10 ⁵	2.8
Commercial Vehicle - Gasoline	3.669x10 ³	7.037x10 ³	1.727x10 ⁵	4.7
Commercial Vehicle - Diesel	4.841x10 ⁴	8.426x10 ⁴	1.889x10 ⁴	3.9
Rail - Diesel	1.132x10 ³	1.862x10 ⁴	3.925x10 ⁴	3.5
Marine - Diesel	4.941x10 ⁴	1.031x10 ⁴	2.703x10 ⁴	5.5
Marine - Heavy Oil	1.144x10 ⁴	1.497x10 ⁴	2.226x10 ⁴	1.9
Aviation - Gasoline	1.643x10 ³	1.432x10 ³	-	-
Aviation - Turbo Fuel	6.928x10 ²	4.184x10 ⁴	1.619x10 ⁵	23.4
Pulp and Paper - Mechanical	7.525x10 ³	9.127x10 ³	1.230x10 ⁴	1.6
Pulp and Paper - Sulphite	3.066x10 ³	3.389x10 ³	4.250x10 ³	1.4
Pulp and Paper - Sulphate	4.605x10 ³	8.289x10 ³	1.401x10 ⁴	3.0
Domestic and Commercial	2.001x10 ⁷	2.497x10 ⁷	3.341x10 ⁷	1.7

the waters, so that many of its beaches are unfit for swimming. Automobile exhaust fumes combine to produce smog, while gaseous elements from industrial sources compound the problem of air quality.

ALBERTA

The Prairie provinces, because they are largely agricultural, have three common pollution sources: pesticides, fertilizers and sewage. In Alberta, mining activities for coal, oil and natural gas constitute another important pollution source.

SASKATCHEWAN

In addition to pollution from domestic sewage and from agricultural sources, oil refineries and chemical companies contribute to the deterioration of the environment in Saskatchewan. Air pollution problems occur in most of Saskatchewan's larger cities; Moose Jaw, Regina, Saskatoon.

MANITOBA

The major environmental concern in Manitoba appears to be water pollution caused by chemicals, mercury in particular. It is claimed however that mercury pollution in the Western provinces is not as serious as in Eastern Canada. High mercury levels in the Red River have resulted in the closing of commercial fisheries in some stretches of the river, although sports fishing is still permitted.

ONTARIO

Ontario's large population, and high degree of urbanization, coupled with high income levels imply serious environmental quality problems for

the province. In addition, the level of concern with environmental problems appears to be fairly high in Ontario. Perhaps the best known example of environmental deterioration in Ontario is the pollution of the Great Lakes. Lake Erie is in an advanced state of eutrophication caused by phosphate pollution from detergents and agricultural runoff. Lake Ontario also suffers from some phosphate pollution, however, its more significant problems are caused by industrial and municipal effluents. The triangle from the Niagara Peninsula to Oshawa is particularly heavily polluted, as this urban belt is heavily populated and industrialized. Hamilton harbour is a particularly bad example of water pollution in the Golden Horseshoe.

Two badly polluted rivers in Ontario are the Grand River and the Thames. The Grand River is a wide, shallow, slow-moving river, whose water levels decrease substantially during the summer months. As a result, the river becomes unable to handle the municipal wastes being dumped into it, creating problems particularly in the Brantford area - as the Grand River serves as the town's water supply. The Thames at London is very much like the Grand River - for similar reasons: an overload of domestic and industrial wastes.

Air pollution is present in the more populous - industrialized regions of the province. The Niagara - Oshawa urban belt around Lake Ontario has already been discussed in terms of water pollution; the belt may also be described in terms of air pollution caused by the usual sources: automobile exhausts, fossil fuel burning and industrial emissions. The worst example is obviously Toronto, with Ontario Hydro's Hearn Generating Plant and garbage incineration being major offenders.

QUEBEC

Quebec is another populous and heavily industrialized province, therefore it also faces serious environmental quality problems. Two particular

causes of environmental deterioration in the province are pulp and paper mills and mining operations.

Perhaps the best known example of water pollution in Quebec is Montreal; of the city's combined domestic and industrial effluents, only some 4 to 8% receive any treatment at all. Given the size of the city, this places extremely heavy burdens on the assimilative capacity of the St. Lawrence River. Treatment facilities are planned for the city in the near future.

Montreal also suffers from air pollution from the usual sources: automobile exhausts, industrial-commercial-domestic heating, industrial emissions and garbage incineration.

NEW BRUNSWICK

In New Brunswick, as in the rest of the Maritime provinces, water pollution is becoming a widespread and serious problem, while isolated examples of air pollution may also be found in the larger population centres. Pulp and paper mills, mining operations, municipal sewage, the use of chemicals for a variety of purposes and food processing plants are the major offenders.

Coastal water pollution in New Brunswick is largely caused by accidental oil spills, and by food, primarily fish processing plants.

NOVA SCOTIA

As in the other Maritime provinces, in Nova Scotia water pollution is a more serious problem than air pollution. Air pollution in Nova Scotia however is by no means insignificant, because of industrial development. The causes of environmental deterioration in the provinces are the usual ones: pulp and paper mills, mining operations, municipal sewage and industrial wastes.

PRINCE EDWARD ISLAND

Although Prince Edward Island is among the least polluted provinces in Canada, a few instances of environmental deterioration may be found already.

Among these are several fish kills, resulting from the use of pesticides. For example, the number of trout in the Desalle river has been reported to decrease substantially as the insecticide Dithane M-45 was used to spray nearby potato crops.

Highway construction activities, without due regard for protection of waterways, have resulted in water pollution in the form of extreme siltation.

NEWFOUNDLAND AND LABRADOR

Given the size of the population and the level of industrial development, Newfoundland appears to have excessive environmental quality problems. Perhaps the very poverty of the province is the reason for this; in the effort to attract industries, the provincial government is reluctant to impose costly environmental quality regulations. This course of action, however, could prove more costly than early control efforts if, with the continuation of present trends, wide-spread reclamation efforts become mandatory.

THE NORTHWEST TERRITORIES AND THE ARCTIC

The Northern ecology faces particularly severe environmental problems from economic development. This is caused by the delicate balance of the northern ecology, and its limited assimilative capacity. Growth rates of plant and animal species have been observed to be particularly slow in northern

climates - implying that damaged species will require lengthy periods of time to re-establish themselves. Small temperature changes, caused by buried oil pipelines for example, could interfere with the permafrost, and alter wildlife patterns. The establishment of a new balance will again require a long time period. Sewage and garbage take a long time to decompose in colder temperatures.

The biggest environmental concern of the North has been with oil pollution resulting from several oil spill accidents. At Yellowknife, for example, thousands of gallons of fuel oil leaked from a storage tank, causing oil slicks, and polluting the Great Slave Lake as far as Snowdrift.

It is one thing to enumerate the cross-country environmental problems, it is another to designate the legislative responsibility for, and the control over, a given problem. While a similar statement could be made for all social welfare concerns, the environment is such a newly recognized element that jurisdictions have yet to be established through the constitution and the courts of law.

3.4 The Legislative and Legal Framework⁽⁴³⁾

The British North America Act, through its definition of provincial and federal prerogatives, creates a complex pattern of overlapping jurisdictions in relation to practically every environmental problem. It is not surprising, therefore, that at this early stage of public concern a modus operandi for a division of powers and responsibilities remains to be worked out.

Among other things, the exclusive legislative authority of the Parliament of Canada extends to all matters coming within the classes of subjects below:

1. To make laws for the peace, order, and good Government of Canada, in relation to all matters not coming within the classes of subjects assigned exclusively to the legislatures of the provinces.
 2. The regulation of Trade and Commerce.
 3. The raising of money by any mode or system of taxation.
 4. Navigation and shipping.
 5. Sea coast and inland fisheries.
 6. The criminal law, except the constitution of courts of criminal jurisdiction, but including the procedure in criminal matters.
- The provinces, on the other hand, may make laws relating to the

following among others:

1. Municipal institutions in the province.
2. Local works and undertakings other than such as are of the following classes:-
 - (a) Lines of steam or other ships, railways, canals, telegraphs, and other works and undertakings connecting the province with any other or others of the provinces, or extending beyond the limits of the province.
 - (b) Lines of steam ships between the province and any British foreign country.
 - (c) Such works as, although wholly situated within the province, are before or after their execution declared by the Parliament of Canada to be for the general advantage of Canada or for the advantage of two or more of the provinces.
3. The incorporation of companies with provincial objects.
4. Property and civil rights in the province.
5. The imposition of punishment by fine, penalty, or imprisonment for enforcing any law of the province made in relation to any matter coming within any of the classes of subjects enumerated above.

Generally all matters of a merely local or private nature in the province.

Further, federal powers are defined so as to give Parliament the right to make laws in relation to agriculture and immigration, and any corresponding provincial laws shall have effect only insofar as they are not repugnant to federal acts. As well, the following public works and property of each province are designated as property of Canada:

Canals, with lands and water power connected therewith.

Public harbours

Lighthouses and piers, and Sable Island.

Rivers and lake improvements.

On the other hand, all lands, mines and royalties are assigned to the provinces.

Interpretations of the Constitution over the years have strongly weakened federal powers with respect to the regulation of trade and commerce. Indeed, our federal powers in this arena are puny compared to those of the U.S. Congress. The assignment of powers over property and civil rights to the provinces further weakens the power at the centre pertaining to the commercial arena.

The general federal power "to make laws for the peace, order and good government" might support legislation whenever it was desirable to establish a uniform law throughout the country. Although this may have been so in the distant past, later constitutional decisions have interpreted this section in favour of provincial powers. It thus becomes possible to invoke its support in emergency situations only. Notwithstanding, courts have recently decided that certain specific matters, aeronautics, telecommunications, atomic energy and the beautification of the national capital region fall within the general power and federal regulation, and such may be forerunners for decisions which broaden the scope of the general power.

Pending such evolution, and federal-provincial agreements, parliament's

powers will be confined mainly to such specifics as the foregoing and those such as fisheries and waterways explicitly designated as federal jurisdictions. We might take encouragement from the outcome of the recent federal-provincial conference in Victoria where it was indicated that most provinces would accept standards and regulations from the centre provided enforcement remained in provincial hands. We might also moderate our optimism with a degree of pessimism in the light of the general provincial record for breathing soft on industrial polluters. Be that as it may, the citizenry can take as a strong indicator of progress in solving the problems of the environment the degree and rate at which federal-provincial cooperation develops.

Of prime interest to the private citizen is the recourse to the law which is available to him in defense of his civil rights and property. While the common law is explicitly concerned with the needs of those seeking to protect and preserve their proprietary rights against nuisance and trespass, and through the civil courts, to provide redress by way of damages and injunction, pollution problems are usually of such technical complexity, the responsibilities are so divided, and the litigatory resources of industrial and municipal complexes are so great that private parties are essentially impotent. The citizen accordingly has recourse only to that kind of group action and publicity which will establish the pollution problem as a public concern. Under the circumstances, legislators at all levels have a strong responsibility to be responsive to such actions of the citizenry.

As already suggested, legislative and institutional effectiveness is a good measure of progress towards environment goals. The physical environment is a total system, and it requires comprehensive planning and implementation. Widely spread responsibility for different aspects of the environment (in Ontario for water, the Ontario Water Resources Commission; for air, the Metro Toronto Air Pollution Control Division; for solids and noise, institutions unknown) and the absence of an active co-ordinating body generally indicate a poor potential for improvement on a broad front, although some spectacular gains can be made in particular sectors.

While this latter type of sub-optimization cannot be totally avoided, its relative presence or absence often is a measure of our chances of overall success.

We hesitate to argue that the size (number of people employed, budget, etc.), of institutions is a measure of progress and concern with issues. Parkinson's Law works in most bureaucracies and, as we have suggested earlier, the number of policemen does not always indicate the relative degree of law and order; as a matter of fact, often the reverse is true.

The legislation on the books, its interpretation and enforcement may contain useful measures of change. (Cf. Table 13 in Chapter 2 and its expanded source in reference 33.) The size of fine that a polluter must pay, the rules of proof required in court, the ability of individuals to sue the Crown or the private corporations, the incidence of placing liability on public officials or corporate officers rather than on institutions as a whole, the number of court cases entered and the number won may all show a trend towards continued neglect or improvement.

5 A Survey of Indicators for the Environmental Social Arena

In the long run, studies of environmental deterioration and amelioration have an excellent chance of becoming quantified. This is because, with the exception of aesthetic effects, we can envision a dollar-value being placed on both the costs and the benefits attributable to individuals and groups. To quote an SRG analysis⁽⁴²⁾:

Environmental deterioration imposes both costs, and benefits on individuals and groups of people. Benefits are conferred on the polluters: they use environmental resources for waste disposal purposes, free of charge. Costs are borne in avoiding pollution, in treating pollution, and in suffering pollution damages. Avoidance costs are borne by would-be polluters, who recycle their wastes, or use less pollution intensive technologies and/or raw materials. The use of lead-free gasoline is a case in point. Avoiding environmental

deterioration may also take the form of facilities designed to increase the natural assimilative capacity. Treatment costs are incurred in the disposal of wastes: primary, secondary or tertiary sewage treatment, sanitary landfill for solid waste disposal etc. Damage costs result from deteriorating levels of environmental quality. They include the ecological and aesthetic effects discussed above, as well as loss of recreational opportunities, extra drycleaning, laundry, painting etc. costs. Damage costs are also imposed on municipalities producing potable water, and on industries that need pure air or water as inputs for their processes.

In the absence of cost-benefit analyses and of the associated indices of progress or of time-tested indicators, we turn to some surrogate measures as the first tentative step towards rational discourse.

Biological Measures

Some of the best indicators of environmental quality can be found in records of how well the total food-chain elements are doing. Old records could be examined and analysed and new data comprehensively collected on the disappearance of game fish such as trout, to be replaced by coarse fish such as carp and still lower forms like snails, as a measure of natural water quality. Such observations are not only of direct significant interest to the commercial or sports fisherman, but they also represent excellent measures of water temperature, dissolved oxygen and other factors.

The presence or absence of certain birds in urban areas may be a good measure of air pollution. Recall that 19th century miners used canary birds to detect the presence of carbon monoxide. Just as we have accepted the presence of rats as indicative of unsanitary and environmentally unpleasant conditions, it may be advisable to select and then measure as a function of time the density of certain locally common species such as robins and gulls. The records of the Audubon society may already contain a wealth of data of this sort

for all the main industrial areas.

Monitoring

Scientific data collection, its evaluation and publication is an activity from which numerous indicators can be derived. It is also in this arena that major changes in both the quantitative and qualitative sense must take place. To emphasize the complexity and extent of the technical problem of comprehensive monitoring, we draw attention to Table 19 which enumerates the chemical parameters of only one of the problem areas, the public water supply. Current procedures used for analysis of such parameters, being primarily of the manual "wet" chemical variety, are time-consuming and expensive. There is thus an urgent need for the development and installation of automatic physical methods. (44)

TABLE 19

Chemical Parameters for
Public Water Supply

<u>Characteristics</u>	<u>Anion</u>
Alkalinity	Chloride
Hardness	Fluoride
pH	Nitrate and Nitrite
Total Dissolved Solids	Sulfate
Color	Phosphate
Odour	Cyanide
Temperature	
Turbidity	
<u>Organic Compounds</u>	<u>Other</u>
Pesticides (Specific)	Ammonia
Herbicides (Specific)	Dissolved Oxygen
Phenols	Radioactivity
Oils and Greases	- Gross Beta
MBAS (surfactants)	- Radium 226
Carbon Chloroform Extracts	- Strontium %
	Metals

With the current monitoring systems in Canada we have at the very best only a vague indication of the qualitative condition of the overall environment. These systems are totally inadequate for the purposes of determining short-term positive or negative changes of a kind and degree which can serve as a satisfactory base for enforcement of standards. For example, air sampling stations are generally located in downtown areas while the major industrial activity may be taking place in the suburbs. Current stations will often indicate an improving trend in one pollutant, while other pollutants, which are not measured, are at the same time increasing.

Monitoring of water quality is most often done on a spot basis without continuity, while data collection on noise and solid wastes is essentially non-existent. Personnel connected with the collection and evaluation of what is complex bio-chemical information have been traditionally held in low esteem and are often poorly paid. There is also a scarcity of trained people, particularly in specific skills such as toxicology, and there are few places for training, especially at the post-secondary level.

A further problem is that public and private institutions will very often refuse for technical and political reasons to divulge pollution related information which they hold. This has happened in the case of phosphate content analysis of detergents by the federal government and air pollution recordings of the City of Montreal. While the data from monitoring will obviously lead to measures of progress or regress, information about the institutional process is also useful.

It is reasonable to expect that an increasing monitoring activity will be followed by certain actions that will tend to improve environmental conditions. Therefore, increasing expenditures for monitoring stations, higher salaries for personnel involved, frequency of sampling, the enlargement of the number of parameters tested and the distribution of permanent and mobile laboratories may indicate a favorable trend. Increasing educational requirements for employees in the environmental field, the development of educational facilities at the

technological and professional level and the enrolment counts may also be significant.

Concerning the dissemination of information, there should be an analysis and review of the relative freedom of access to data, the frequency of publication of relevant indicators and the institutional rules governing disclosure. These factors are particularly difficult to evaluate, qualitatively or quantitatively, yet they are extremely important. There is not much point in talking about a democratic process of decision making if the public is not properly informed. Effective communication is extremely important in respect to environmental issues, since they are highly complex, they are little understood outside a small group of specialists and they require the commitment of appreciable resources which are in short supply. Increased and sustained public awareness which ultimately results in political action will prompt rational steps towards improvement of our environment. Other aspects of the environmental investment problem are discussed in a later section.

Environmental Attitudes and Perceptions

A measurement of social attitudes using proper sampling and questioning techniques appears to be a very simple way of obtaining an indicator. From the output of existing communications media one can get a very quick impression of public consensus. Fig. 2 , for example, shows the results of a study of environmental perceptions as seen through the output of Canadian newspapers between August 1969 and May 1970. It was concluded that (45)

In sum, it would appear that water pollution is the most significant problem in the deterioration of our environment that we face at this time. The newspapers are willing to attach most of the blame for this problem to industrial effluent but are unwilling to recommend that industry should pay for an effective pollution clean up program. The provinces, in co-operation with the federal government, should bear the primary

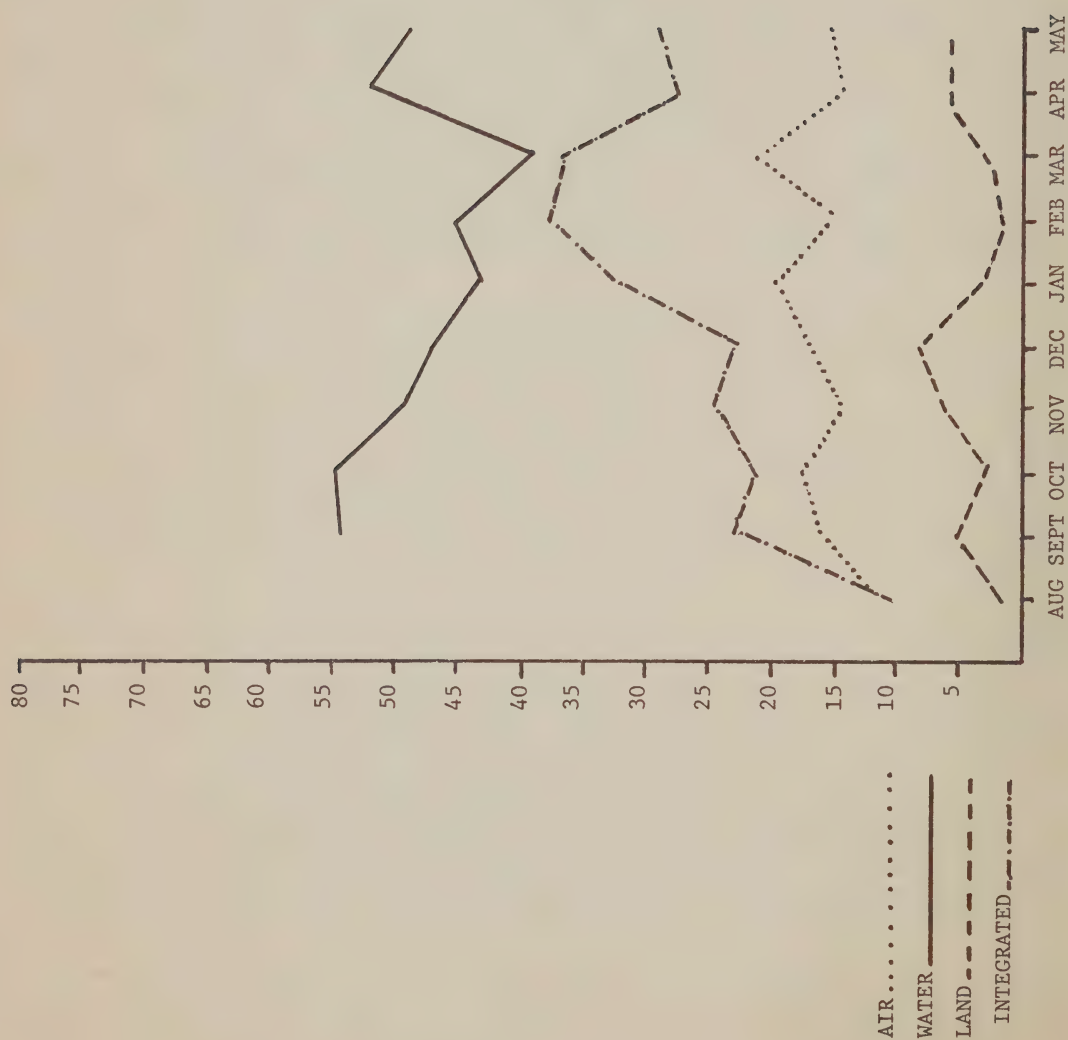


Fig. 2. Percentage Breakdown of Newspaper Reports for Pollution Type

responsibility for managing our environment. The recommended control measures are rather vague but there is a general consensus that the problem should be cleaned up without too much waste of time and there is some willingness to recommend total bans or heavy fines for polluters.

There exists a concensus that perceptions and attitudes are shaped by the individual's past experience, his previous contact with the same or similar environmental stimuli and his cognitive state at a given moment, including a wide array of socially and culturally acquired traits and personality characteristics. An important factor influencing our environmental perception comes from the process of habituation, a classic example of which is the ability of most persons to get used to a constant level of traffic noise or to the sounds of typewriters in an office. The point is that unless we are aware of different qualities of environment we cannot perceive them. Furthermore, people in a democracy are disposed to react to stimuli on the basis that if they possess some knowledge of a situation they will be allowed to participate in the relevant decision making. When this latter condition does not exist, we witness alienation or tuning out, and as a consequence opinion sampling, or even elections, become meaningless as indicators.

Analyses of information transmitted via the printed press demonstrate significant biases, for example "the heavy preoccupation with local pollution problems and apparently strong predisposition on the part of all participants in the debate to deny or minimize their own responsibility and to emphasize the shortcomings of others".⁽⁴⁶⁾ It is also known that employees of certain factories or inhabitants of company towns are often among the last to complain about various forms of pollution if they are made to feel that their jobs are at stake.

One must note also that there is a very significant difference in attitudes which are a function of socio-economic status, education, age and other factors. Fig. 3 from a survey of public reaction to air pollution in Nashville, Tennessee⁽⁴⁷⁾ and Tables 20, 21 and 22 from a recent U.S. Harris Poll⁽⁴⁶⁾ are introduced to demonstrate both the kinds of measures which can be presented through combinations of scientific and sociological data and the overall complexity of the social data.

In conclusion, indices based on public opinions must be considered as less than a perfect tool. Yet, if they are founded upon frequently repeated and carefully designed surveys, they can provide one of the bases for formulating public policy.

Investment in Environmental Quality Control

The level of investment of public or private funds has been frequently used as an indicator of improvement of environmental conditions. It is simple, it can be easily compared to a previous datum, it can be evaluated via various mathematical or economic analyses and it looks good in print. The rationale behind this indicator is as follows: institutions become concerned with certain environmental issues and their response is to commit resources, that is, money. Consequently an activity takes place and is accounted for, and ipso facto an environmental improvement must also have taken place. In other words inputs are taken as proxies for outputs.

Although there exists a certain merit in this kind of logic and hence in the use of level of investment as an indicator, the reliability of the procedure is highly debatable. The greatest problem is the lack of a feedback mechanism which would indicate that the resources were committed wisely and efficiently and that an actual benefit has accrued. Absence of a good monitoring system is only a part of the problem.

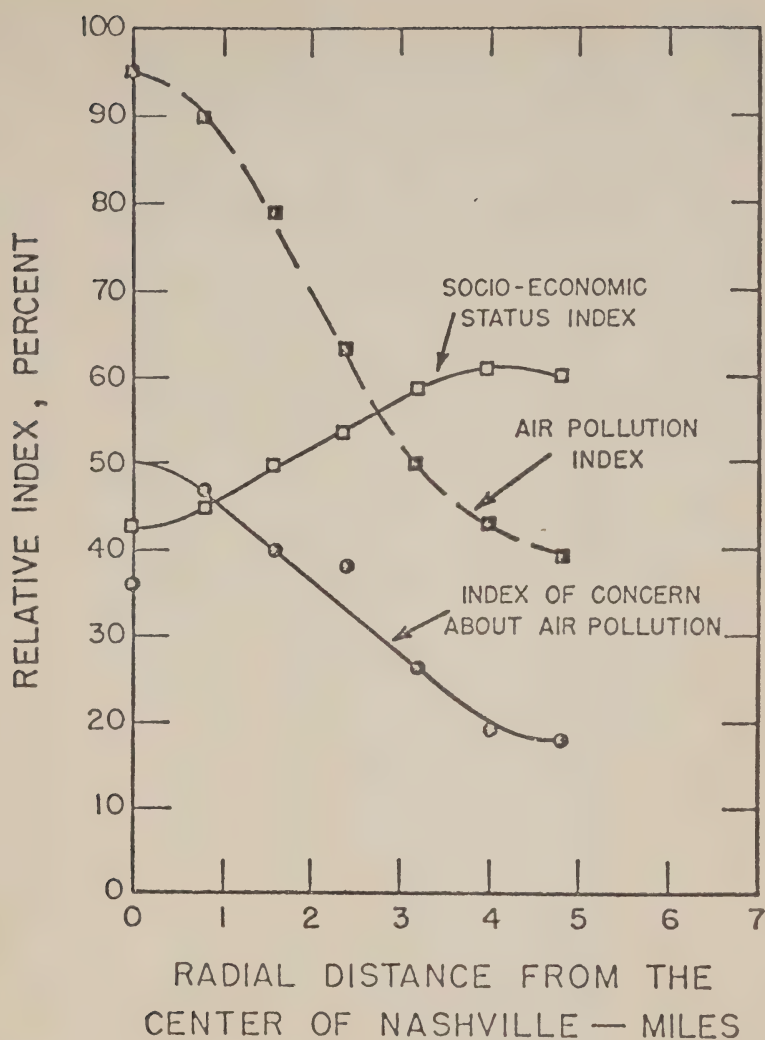


Fig. 3.

Radial distribution from the center of Nashville of air pollution levels, socio-economic status and public concern about air pollution.

"THINKING ABOUT AIR AND WATER POLLUTION, IMPROVEMENT OF LAND AND WATER, FORESTS, FISH AND WILDLIFE, RECREATION AND PARK AREAS -- DO YOU THINK PROGRAMS FOR IMPROVEMENT OF THE NATURAL ENVIRONMENT NOW RECEIVE TOO LITTLE ATTENTION AND FINANCIAL SUPPORT FROM THE GOVERNMENT, NOW RECEIVE TOO MUCH ATTENTION AND FINANCIAL SUPPORT, OR JUST THE RIGHT AMOUNT?"

	Receive Too Little %	Receive Too Much %	Receive Right Amount %	Not Sure %
<u>Total</u>	<u>52</u>	<u>5</u>	<u>22</u>	<u>21</u>
East	58	3	18	21
Midwest	53	6	27	14
South	44	4	21	31
West	54	7	21	18
8th grade	36	6	18	40
High school	55	4	24	17
College	65	4	21	10
Men	57	6	19	18
Women	47	4	25	24
White	54	5	22	19
Black	33	6	18	43
16 - 20	57	4	24	15
21 - 29	59	3	26	12
30 - 34	50	3	22	25
35 - 49	55	5	21	19
50 plus	47	6	19	28
Cities	58	4	16	22
Suburbs	66	2	21	11
Towns	42	7	24	27
Rural	42	6	27	25
Under \$5,000	36	6	22	36
\$5,000 - 9,999	56	5	21	18
\$10,000 plus	64	4	23	9

TABLE 21

"CURRENTLY, MANY ELECTRIC GENERATING PLANTS ARE INCREASING AIR AND WATER POLLUTION. THE ELECTRIC COMPANIES SAY IT WILL BE EXPENSIVE TO ELIMINATE THIS POLLUTION. TO STOP THE POLLUTION DESTROYING OUR PLANT-LIFE AND WILDLIFE, WOULD YOU BE WILLING TO PAY AN INCREASE IN YOUR MONTHLY ELECTRIC BILL OF \$1?"

	<u>Willing</u> %	<u>Not Willing</u> %	<u>Not Sure</u> %
<u>Total</u>	<u>28</u>	<u>62</u>	<u>10</u>
East	28	64	8
Midwest	33	63	4
South	17	67	16
West	35	52	13
8th grade	13	75	12
High school	29	62	9
College	43	49	8
Men	29	63	8
Women	28	60	12
White	29	62	9
Black	23	63	14
16 - 20	45	39	16
21 - 29	36	56	8
30 - 34	27	65	8
35 - 49	30	61	9
50 plus	21	69	10
Cities	29	62	9
Suburbs	35	58	7
Towns	26	62	12
Rural	23	66	11
Under \$5,000	15	73	12
\$5,000 - 9,999	28	64	8
\$10,000 plus	41	51	8

TABLE 22

"HAVE AIR AND WATER POLLUTION AFFECTED YOUR PERSONAL ENJOYMENT OF YOUR SURROUNDINGS AND YOUR LIFE IN ANY WAY?"

	<u>Yes</u> %	<u>No</u> %	<u>Not Sure</u> %
<u>Total</u>	<u>29</u>	<u>68</u>	<u>3</u>
East	31	66	3
Midwest	33	65	2
South	17	79	4
West	39	58	3
8th grade	15	81	4
High school	30	67	3
College	42	55	3
Men	33	64	3
Women	26	71	3
White	30	68	2
Black	21	69	10
16 - 20	31	64	5
21 - 29	41	58	1
30 - 34	25	72	3
35 - 49	36	60	4
50 plus	21	76	3
Cities	31	64	5
Suburbs	43	55	2
Towns	25	73	2
Rural	18	79	3
Under \$5,000	15	82	3
\$5,000 - 9,999	29	67	4
\$10,000 plus	43	56	1

At the present time, we do not know whether increasing pollution abatement expenditure actually results in an improvement in the environment. For one thing, most of the financial information does not distinguish between the administration, operating and other costs, between the capital costs related to the principal purpose of an institution and the ancillary costs, and so on. The reports are often puzzling. For example, why is the private industry cost of treatment of waterborne wastes about 50% less than the cost of similar municipal operations?

Institutional arrangements and jurisdictional divisions further distort the picture. Centralized treatment of waste is obviously more efficient than a similar process taking place in a number of locations in proximity. Yet this very infrequently happens because of artificial municipal or provincial boundaries. Accounting definitions of "environmental improvements" are often incorrect. For example, is construction of an incinerator, which transforms one type of waste into another, a real improvement item?

Finally, as a problem within a problem, many installations operate at a fraction of their capability because of improperly trained personnel and the lack of process control.

Nonetheless, certain types of financial indicators bear considerable promise. Examples are investment in research and development, in recycling techniques or plants, in information dissemination and in environmental education. Benefits from such investment, at least in the immediate future, is expected to be greater than from comparable sums of money invested in conventional pollution abatement plants. The use of financial data as social indicators should be encouraged since it is at the present time, and for the foreseeable future, a well-established common language between the populace and the various institutions. What is further required is a very careful evaluation of such data so that the "truth in spending" becomes evident.

3.6

Conclusion

The current failure of economic or other indicators to adequately delineate our environmental condition is secondary to the inadequacy of information transfer within the decision-making process. Major policies concerning environmental goals are being presently developed by a cabinet-technocracy complex in consultation with a narrow sector of population. These policies represent at very best what the decision-makers think the society wants, combined with a very limited capability of comparison with what society really wants.

The fundamental problem is that the population at large does not know what it should want, is unable to measure performance against uncertain objectives and is thus deprived of means of expressing its approval or disapproval of actions taken on their behalf. Our political process, based on periodic elections, often seems to lose its ability to translate the popular desires into decisions. The results, already apparent in U. S., are generally apathy, alienation and incidence of violent reaction. Cases of "anti-pollution guerilla" activity are known and may be expected to increase, although the benefit derived from such actions usually is minor compared to the social cost.

Valid environmental accounting combined with a feedback mechanism, conceived as an honest two-way street, should become a part of the political process of mutually informing the governed and the government as to how are we doing. Such a development is possible, in spite of the difficulties outlined in this chapter. Its implementation should be a high priority item.

4. INCOME AND POVERTY

4.1 Introduction

Deep poverty, like pollution, represents a failure of society to find a correct balance between the forces of moderation or social equalization and the predatory forces of progress and entrepreneurship. The analogy extends not only to the deep psychic "pollution" and alienation of many poor persons but also to the deterioration of an irreplaceable human resource. Poverty, like deterioration of the environment, has a considerable potential for quantification. This is because reported income and, in particular, low income, are natural (although by no means inclusive) indicators of incidence. Canadian studies to date are quite comprehensive⁽⁴⁸⁻⁵⁴⁾ probably because this is the social defect which weighs most heavily on the conscience of society. Indeed, this aspect of the social slate is well out front in the field of social reporting in Canada. Because the reporting in the economic sphere to date is quite comprehensive we offer only a brief exposition here.

Whether one believes that palliative welfare programs are the key to elimination of poverty, or alternatively, that the dole is counterproductive, and so a cure must be found in a drastic restructuring of the institutions of production and distribution, it remains that understanding poverty must begin with a study of the institutions and processes whereby scarce values are distributed to the populace. These processes are the outcome of a long political evolution and are sustained by current institutions, the goals and values of our society. That these institutions and values favour some persons strongly is often cited as a root cause of poverty.

It is claimed further that the prevailing patterns of wealth distribution explicitly discriminate against certain members of society, and particularly against their necessarily disadvantaged children. On the other side of the ideological coin it is argued that an inequitable distribution of wealth is an essential of a viable economy.

In any case, no one denies the fact that extreme inequities exist and that a sizeable fraction of our population lives in misery. Our goal in this arena must therefore be the development of policies whereby misery associated with lack of income is once and for all eliminated. To establish the nature and extent of this social problem it is first necessary to delineate a series of indicators which will quantify the distribution of resources and to establish the causal relationships connecting current income patterns and changes which might in turn suggest policies leading to greater economic and social equity.

4.2 Problems in Income Analysis

The commonest measure of access to resources is that given by the reported individual incomes of those who participate in the labour force. There are, of course, many problems and deficiencies in the use of the data derived from this source alone. For one thing data of this sort says little of nothing about the distribution of total wealth. For example, many forms of income from investment are not taxed, and therefore not reported. The most common unreported income has to do with the ownership of a house. An individual with \$20,000 invested in a house in which he lives receives an investment return. On the other hand, for the poor who do not own property, payment for accommodation is a direct drain on income. Economists have made a distinction between types of income in order to allow for this contingency. Direct money income or cash income is differentiated from real income or economic income, the latter encompassing such tangible income producing assets as a house, a hunting lodge, a cottage or a yacht.

Capital gains have a similar character and previously to 1971 there were no significant capital gains taxes in Canada. The consequence has been that no comprehensive data has been gathered on the principal individual income and wealth accumulation mechanism operative in the market place.

There is also a deficiency in the reporting of earned income since

individual tax returns, which are the primary source of data, may include both intentional and unintentional errors. This deficiency extends to legal contrivances which lead to non-reportable income and which, as a result, are not subject to tax. Among these contrivances are stock options, expense accounts, and pension schemes. It is interesting to note that, in the eyes of the law, this type of activity is defined as "tax avoidance" as opposed to "tax evasion". The latter is the falsification of tax returns whereas the former involves the use of a legal loophole which operates on the principle that no one is called upon to pay more tax than the law demands.

The problem of analysis is again further complicated as a result of shifts in the real value of dollar income through time due to inflationary pressures. Furthermore, there are sources of error which derive from varying demographic characteristics of the population (such as family size) and differential price levels. It is generally conceded by analysts that the net result of most of the deficiencies outlined is that there is a substantial understatement of earnings on the part of higher income groups.

An objective social report must devise mechanisms to overcome the above-mentioned deficiencies in the reporting system. Furthermore, a comprehensive analysis must include a detailed account of the distribution of corporate wealth, and hence power, in society. Possible guidelines to such an analysis are found in the works of John Porter⁽⁵²⁾ and W.I. Gillespie⁽⁵³⁾

4.3 Income Profiles

Subject to the qualifications outlined, it is fruitful to explore income profiles in the traditional way. Of course, such an inquiry must be considered as only one of many possible dimensions of analysis.

Consistent data on income distributions is available only for the period following 1951. Indeed the 1961 census was the first to ask comprehensive questions about income⁽⁵⁴⁾.

Income by Occupation

The purpose of examining income profiles by occupation is to arrive at a measure of the range and distribution of incomes which prevails among labour force participants. The exercise is also designed to demonstrate the incidence of inequities of income between labour force participants and non-participants as well as among labour force participants. 1961 census statistics made it evident that labour force participation in itself is insufficient guarantee that an income recipient received an adequate income. For example, that data implied that the median earnings for males were approximately \$3,800, and nearly one-fifth of males reported income from employment of less than \$2000. A perception of the wide range of income existing in the occupation structure can be gained from the data presented in Table 23. (We reiterate here that the figures for the high income groups represent an understatement of earnings for that group while for the low income groups the figures are fairly accurate.) It can be seen that the categories of loggers, farm workers and labourers, which are filled by those possessing minimal skills, minimal education, and, for the most part, little in the way of union organization, occupy the most disadvantaged position in the labour force. This segment is also the hardest hit by unemployment; estimates for 1961 state that only 51 percent of labourers worked over 40 weeks in that year. The importance of educational attainment as a determinant in the income profile is clearly indicated in Tables 24 and 25.

Income by Sex

One of the most striking inequities in the distribution of incomes in society is found in the differentials in earned income between men and women workers. Data for 1961 show that the average wages and salaries of full-year

Percentage Distribution of Current Non-farm Male Labour Force by Class of Worker,
by Employment Status and Broad Occupation, and by Size of Income from Employment,
Year Ended May 31, 1961

Year Ended May 31, 1961												
Class of worker, employment status and occupation	Income group										Average income	Median income
	Under \$1,000	\$1,000- 1,999	\$2,000- 2,999	\$3,000- 3,999	\$4,000- 4,999	\$5,000- 5,999	\$6,000- 9,999	\$10,000- and over	Total			
										p.c.	p.c.	p.c.
Worked for Other —												
All occupations	8.5	9.6	14.6	22.8	19.4	11.2	11.2	2.6	100.0	3,952	3,743	
Managerial	1.0	1.6	3.4	9.5	15.0	16.2	36.1	17.1	100.0	7,248	6,366	
Professional and technical	3.7	4.7	5.9	12.4	15.6	16.2	33.2	8.5	100.0	5,794	5,475	
Clerical	6.7	8.1	17.1	29.6	24.1	9.8	4.3	0.3	100.0	3,508	3,625	
Sales	11.1	8.7	13.8	18.8	15.8	12.6	15.8	3.4	100.0	4,104	3,862	
Service and recreation	10.7	11.8	19.6	24.8	18.9	7.8	5.7	0.7	100.0	3,295	3,292	
Transport and communication	7.8	10.2	17.0	25.1	21.2	9.7	8.1	1.0	100.0	3,613	3,582	
Farm workers	36.1	27.3	19.3	11.5	3.8	0.8	0.7	0.3	100.0	1,715	1,466	
Loggers	24.5	29.8	19.0	12.0	7.4	3.3	3.4	0.6	100.0	2,205	1,831	
Fishermen, trappers and hunters	36.8	25.6	16.4	8.8	6.3	3.0	2.5	0.5	100.0	1,906	1,420	
Miners, quarrymen	3.8	6.3	11.9	23.2	25.6	16.3	12.3	0.7	100.0	4,207	4,178	
Craftsmen and production workers	5.6	8.5	15.0	25.7	24.2	13.3	7.4	0.4	100.0	3,735	3,811	
Labourers	22.2	20.7	21.9	22.9	9.7	2.0	0.7	0.2	100.0	2,300	2,301	
Self-employed —												
All occupations	7.4	10.6	15.1	15.7	11.2	9.2	16.0	14.8	100.0	5,929	4,085	
Managerial	3.6	7.0	13.0	15.3	13.0	11.5	20.4	16.2	100.0	6,567	4,798	
Professional and technical	2.2	3.3	4.0	5.4	5.7	6.8	23.2	49.5	100.0	12,286	9,896	
Clerical	6.7	10.6	12.8	17.9	13.8	13.3	18.0	6.9	100.0	4,798	4,152	
Sales	6.3	9.3	13.4	13.8	11.2	10.9	20.8	14.2	100.0	5,577	4,493	
Service and recreation	6.3	13.3	22.7	23.4	13.9	6.4	4.5	4.5	100.0	4,026	3,302	
Transport and communication	4.9	12.7	22.9	20.8	11.6	8.7	11.9	6.5	100.0	4,363	3,383	
Farm workers	20.6	16.5	23.9	15.3	11.0	5.4	5.2	2.3	100.0	2,763	2,464	
Loggers	32.8	25.5	15.9	10.3	3.9	4.3	5.4	2.0	100.0	2,301	1,619	
Fishermen, trappers and hunters.	38.9	27.0	17.2	7.7	2.9	2.0	3.4	0.8	100.0	1,809	1,336	
Miners, quarrymen	11.3	12.1	33.0	12.1	10.9	10.0	7.4	3.4	100.0	3,320	2,838	
Craftsmen and production workers	8.1	14.9	21.2	22.5	13.0	8.3	8.5	3.5	100.0	3,704	3,210	
Labourers	26.3	28.1	18.6	12.9	4.1	4.9	3.0	2.3	100.0	2,384	1,833	

TABLE 24⁽⁵⁴⁾

— Lifetime Earnings Based on Arithmetic Means for Males Aged 25 to 64, by Years
of Schooling Completed, as at June 1, 1961

Occupation	No schooling or elementary	High school 1 - 3	High school 4 - 5	Some university	University degree
	\$	\$	\$	\$	\$
All occupations	131,026	168,257	209,484	234,448	353,624
Managerial occupations	200,957	232,718	283,810	315,637	423,328
Managers, specified	198,306	229,703	266,760	282,355	355,868
Owners and managers, n.e.s.	201,132	233,177	287,147	321,828	431,322
Manufacturing	223,516	273,880	341,497	382,798	490,671
Construction	222,149	246,363	296,846	339,942	472,533
Transportation, communication and other utilities . .	247,010	255,704	292,606	317,867	418,236
Wholesale trade	218,623	261,635	314,244	339,909	448,998
Retail trade	177,769	201,770	245,657	266,662	348,889
Finance, insurance, real estate	277,364	297,781	322,443	380,923	467,382
Community, business and personal service	172,267	193,287	248,195	291,024	414,757
Public administration	183,105	192,131	218,575	241,341	327,516
Professional and technical occupations	171,359	195,985	224,094	225,474	354,143
Professional engineers	—	227,803	260,786	280,328	336,566
Physical scientists	—	—	—	—	318,288
Biologists and agricultural professionals	—	—	—	—	281,466
Teachers	172,697	172,269	207,284	214,964	301,067
Professors and college principals	—	—	—	—	357,773
School teachers	—	178,636	206,971	214,825	286,314
Health professionals	171,740	172,803	187,778	254,532	497,846
Physicians and surgeons	—	—	—	—	583,535
Dentists	—	—	—	—	402,566
Law professionals	—	—	—	—	468,154
Lawyers and notaries	—	—	—	—	469,394

— Lifetime Earnings Based on Arithmetic Means for Males Aged 25 to 64, by Years
of Schooling Completed, as at June 1, 1961 — concluded

Occupation	No schooling or elementary	High school 1 — 3	High school 4 — 5	Some university	University degree
	\$	\$	\$	\$	\$
Professional and technical occupations — continued					
Religion professionals	92,081	105,639	107,367	113,779	133,311
Artists, writers and musicians	155,937	212,661	236,829	256,087	260,883
Other professionals	180,640	199,632	227,461	224,048	315,756
Architects	—	—	—	—	402,819
Accountants and auditors	—	229,623	258,684	259,078	349,823
Social welfare workers	—	156,758	181,036	168,146	215,752
Professional occupations	134,674	149,782	160,573	159,867	172,995
Other occupations	142,392	175,234	209,534	216,961	255,850
Service and recreation occupations	112,255	142,282	164,420	191,245	245,343
Protective service occupations	136,576	163,215	190,031	218,147	282,090
Civilian protective occupations	131,824	158,939	170,912	176,285	—
Housekeepers, waiters, cooks and related workers	95,136	108,926	112,291	—	—
Other service occupations	105,684	123,748	135,737	—	—
Transport and communication occupations	135,614	160,604	182,961	196,172	—
Supervisors of transport operations	162,355	180,426	194,790	—	—
Operators, railroad	192,118	200,747	203,164	—	—
Operators, water transport	139,561	185,116	204,970	—	—
Operators, road transport	126,774	141,757	145,476	—	—
Other transport occupations	120,929	149,149	—	—	—
Other communication occupations	125,223	152,385	177,236	—	—
Farm workers (other than farm operators or managers)	69,498	92,601	101,122	—	—
Loggers and related workers	82,937	122,719	141,836	—	—
Fishermen, trappers and hunters	66,941	100,793	—	—	—
Miners, quarrymen and related workers	150,288	171,731	185,164	—	—
Craftsmen, production process and related workers	135,474	157,451	170,676	169,593	194,392
Millers, bakers, brewers and related food workers	125,716	138,117	144,798	—	—
Tire builders, vulcanizers and other rubber workers	141,098	154,479	—	—	—
Leather cutters, lasters, sewers and other leather workers	104,477	116,028	—	—	—
Spinners, weavers, knitters and other related workers	113,159	124,811	—	—	—
Tailors, furriers, upholsterers, and related workers	121,256	135,430	139,020	—	—
Carpenters, cabinet makers, sawyers and related workers	111,363	131,914	139,166	131,189	—
Paper makers, still operators, chemical and related workers	161,920	182,038	195,619	—	—
Printers, bookbinders and related workers	181,088	196,041	198,309	—	—
Furnacemen, moulders, blacksmiths and related metal workers	154,861	162,678	172,739	—	—
Machinists, plumbers, sheet metal workers and related workers	147,797	160,937	167,578	166,043	—
Mechanics and repairmen	140,045	155,715	162,737	165,415	—
Electricians and related electrical and electronics workers	154,756	174,419	184,577	179,012	—
Painters, paperhangers, and glaziers	114,031	123,942	124,507	—	—
Bricklayers, plasterers and construction workers, n.e.s.	127,406	151,670	168,515	—	—
Clay, glass and stone workers	133,108	149,553	—	—	—
Stationary engine and excavating and lifting equipment operators and related workers	143,020	160,456	177,856	—	—
Longshoremen and other freight handlers	114,340	130,423	143,457	—	—
Sectionmen and trackmen	116,525	127,631	—	—	—
Other production process and related occupations	156,736	179,260	197,199	190,704	220,374
Labourers, n.e.s.	114,175	111,657	118,079	—	—
All occupations	131,026	168,257	209,484	234,448	353,624

women workers were only \$2,620 or 59 percent of the male average of \$4,446 (see Table 26). There are of course also marked differences in the participation rates of the male and female populations in the labour force because of the conventional division of responsibilities in marriage.

Women confront an occupational structure which discriminates against them by relegation to lower income jobs. For the most part, unskilled and uneducated women are found in low paying clerical jobs or as production workers such as packers in plants, dressmakers in the textile industry, waitresses and sales clerks (see Table 27). Even in the professions, female earnings average only about 60 percent of their male counterparts (see Table 28).

The examples given above are obviously not exhaustive of the possibilities in this area. Analysis of the relationships between incomes and education, ethnicity and age can and should be carried out for a comprehensive report. The importance of such data can be inferred from Table 29, giving the distribution of income by ethnic groups in Quebec.

TABLE 26⁽⁵⁴⁾

— Percentage Distribution of Wage-Earners in Current Labour
Force by Sex and Size of Wages and Salaries, Year Ended
May 31, 1961

Income group	All wage-earners		Full-year workers ^a	
	Male	Female	Male	Female
	p.c.	p.c.	p.c.	p.c.
Under \$1,000	9.6	25.2	0.8	4.6
\$ 1,000 — \$1,999	11.0	25.1	3.9	22.5
2,000 — 2,999	15.6	26.4	13.4	37.5
3,000 — 3,999	22.1	15.8	26.2	24.3
4,000 — 4,999	18.7	4.8	24.4	7.3
5,000 — 5,999	10.6	1.5	14.3	2.2
6,000 — 6,999	5.2	0.6	7.2	0.9
7,000 — 9,999	5.0	0.5	6.9	0.7
10,000 and over	2.1	0.1	2.9	0.1
Totals	100.0	100.0	100.0	100.0
Average wages and salaries \$	3,679	1,995	4,446	2,620
Median wages and salaries \$	3,624	1,988	4,234	2,610

^aWorking in 49 to 52 weeks during the previous year and usually working 35 hours or week.

TABLE 27⁽⁵⁴⁾

— Percentage Distribution of Males and Females in Current Labour Force with Selected Levels of Schooling by Broad Occupation, as at June 1, 1961

Occupational group	Males				Females			
	Elementary schooling	Secondary 4-5 years	University degree	Total labour force	Elementary schooling	Secondary 4-5 years	University degree	Total labour force
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Managerial	5.7	18.4	17.1	10.2	3.3	3.1	3.5	3.3
Professional and technical	0.8	11.0	68.5	7.6	2.0	28.1	78.1	15.4
Clerical	3.1	14.4	2.8	6.9	8.3	45.4	11.8	28.8
Sales	2.8	10.1	3.7	5.6	7.8	6.1	1.7	8.4
Service and recreation	8.3	7.9	2.9	8.5	39.5	8.7	2.9	22.4
Transport and communication	8.8	4.8	0.5	7.5	1.2	1.9	0.3	2.2
Farmers and farm workers	18.7	4.6	0.9	12.2	9.6	1.2	0.3	4.3
Loggers	3.0	0.4	0.1	1.7	--	--	--	--
Fishermen, trappers and hunters	1.4	0.1	↓	0.8	--	--	--	--
Miners and quarrymen	1.9	0.7	0.1	1.4	--	--	--	--
Craftsmen and production workers	34.1	21.6	2.2	28.8	23.7	2.9	0.6	11.6
Labourers	9.4	2.6	0.3	6.3	2.4	0.3	0.1	1.2
Not stated	2.2	3.3	1.0	2.6	2.3	2.4	0.8	2.5
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 28⁽⁵⁴⁾

— Average Wages and Salaries of All Wage-Earners in Current Labour Force and of All Wage-Earners Employed the Full Year, by Occupation and Sex, Year Ended May 31, 1961

Occupation	All wage-earners			Employed full year ^a		
	Average		Ratio F/M	Average		Ratio F/M
	Male	Female		Male	Female	
	\$	\$		\$	\$	
Managerial	6,673	3,207	.48	6,848	3,531	.52
Professional and technical	5,448	2,996	.55	5,909	3,531	.60
Clerical	3,409	2,340	.69	3,818	2,826	.74
Sales	3,908	1,367	.35	4,608	2,066	.45
Service and recreation	3,161	1,158	.37	3,690	1,722	.47
Transportation and communication	3,415	2,123	.62	4,006	2,617	.65
Farm workers	1,401	607	.43	2,081	1,240	.60
Craftsmen and production workers	3,566	1,788	.50	4,170	2,295	.55
Labourers	2,157	1,449	.67	3,253	2,168	.67
Totals	3,679	1,995	.54	4,444	2,619	.59

^a Wage-earners working in 49 to 52 weeks and usually working 35 hours or more per week.

TABLE 29⁽⁵⁰⁾

Average income of salaried males in 14 ethnic groups, Quebec, 1961

ETHNIC GROUP	In dollars	Index
General average	3469	100.0
British	4940	142.4
Scandinavians	4939	142.4
Dutch	4891	140.9
Jewish	4851	139.8
Russians	4828	139.1
Germans	4245	122.6
Poles	3984	114.8
Asians	3734	107.6
Ukrainians	3733	107.6
Other Europeans	3547	102.4
Hungarians	3537	101.9
French Canadians	3185	91.8
Italians	2938	84.6
Native Indians	2112	60.8

From *Canadian Dimension* 5, no 8 (Feb 1969), 17

4.4 Income Inequities

The notion of a poverty line has been the subject of a great deal of debate and analysis. The motive for such studies is to arrive at an objective income figure below which any individual or family earning less than the indicated amount would occupy a "poor situation". It is supposed that by using this method it is possible to arrive at a reasonable measure of the number of poor in society.

The idea of a poverty line comes under criticism for two main reasons. Firstly, it is argued by statisticians that the use of a fixed point on the income scale does not take into account that family living

requirements are affected by the size of family, its age, composition, its place of residence, such as farm or urban, and the price levels in the area. Further, it is argued that no account of capital assets is taken which would yield (e. g., to a property owner) lower money income requirements. Secondly, it is argued by the more ideologically-minded, that the whole exercise bogs down into a statistical morass, and the endeavour becomes but another method to cloud and confuse the more important structural and political reasons for poverty, that even if it were possible to elevate all citizens above a given poverty line, it would in no way change the hierarchy existing in society and hence the relative power positions.

The most fruitful method thus far used in Canada for estimating low income in society is based upon studies carried out on the basis of the 1961 census. Low income families were defined as families with incomes insufficient to purchase much more than the basic essentials of food, clothing, and shelter. On the basis of a 1959 "Survey of Family Expenditures" collected from a sample of about 2000 families living in urban centres with populations of 15,000 or more, it was calculated that on average, families allocated about half of their incomes to these needs. It was therefore assumed that any family using up a good deal more than half its income on essentials, would probably have severe financial difficulties in allocating money to drugs, medical care, education, recreation, savings, etc.

On the basis of this assumption the Fifth Annual Report (1968) of the Economic Council of Canada came out with two sets of estimates of the size and character of the poverty problem⁽⁴⁸⁾. For the first estimate, it was assumed that all those using 70 percent or more of their incomes for food, clothing, and shelter, would occupy a low income situation. When they controlled for family size, it was found that all those single persons with incomes below \$1,500, families of two with less than \$2,500, and families of three, four and five with incomes of less than \$3,000, \$3,500, and \$4,000 respectively, would be part of this group.

On the basis of these figures, it was estimated that as of 1961, some 916,000 non-farm families plus 416,000 individuals were living below these levels. The Council further estimated that the total number of persons involved was about 4.2 million, including 1.7 million children under 16 years of age. For the non-farm population, it was estimated that some 138,000 or 50 percent of all families dependent on farming for a livelihood were below the income levels used. On this basis, it was estimated that for all of Canada, just under 29 percent of the total population had chronically low incomes in relation to their needs. Some current estimates say that as of 1971, some 4.5 million Canadians were living in poverty.⁽⁴⁹⁾ The Council conceded that these were conservative estimates.

A second set of estimates prepared by the Council on the basis of expenditures on essentials of 60 percent of income instead of 70 percent, greatly increased the poverty lines. This new assumption brought the cut-offs up to \$1,900 for a single person, \$3,200 for a family of two, \$4,000 for families of three and four, and \$5,000 for a family of five. When these figures were applied to the 1961 non-farm population, it was found that 41 percent of this group could be said to be living in poverty.

The Report of the Special Senate Committee on Poverty has updated this information and offers in Table 30 a comparison of their poverty lines with the earlier ones of the Economic Council.

TABLE 30⁽⁵¹⁾

Comparison of Senate Committee and Statistics Canada/E.C.C. poverty lines by family unit size, 1969

Family unit size	Senate Committee poverty lines	Statistics Canada-E.C.C. poverty lines
	\$	\$
1	2,140	1,894
2	3,570	3,157
3	4,290	3,788
4	5,000	4,420
5	5,710	5,051
6	6,430	5,051
7	7,140	5,051
10	9,290	5,051

4.5 Measures of Progress

Two methods which are used to examine income inequality involve the use of comparisons by quintiles and by Lorenz Curves or Gini coefficients.

The quintile method consists of dividing the family units into fifths, that is, the one fifth of the family units with the lowest incomes, and the one fifth with the highest share, etc. When the data for the 15 years up to 1965 are presented in this way, it can be seen that there has been relatively little change in the distribution of family income over that period of time (see Table 31). Almost 40 percent of the total money received as reported income accrues to the top 20 percent of families. Furthermore, the figures in Table 31 show that of the top group, some 25 percent of the total income earned in society accrues to only 9.1 percent of the population.

TABLE 31⁽⁴⁸⁾

Distribution of Nonfarm Family Income Before Tax

	DISTRIBUTION OF TOTAL INCOME			AVERAGE INCOME PER FAMILY
	1951	1961	1965	1965
	(Percentage)			(Dollars)
Lowest-income fifth of families	6.1	6.6	6.7	2,263
Second fifth	12.9	13.4	13.4	4,542
Third fifth	17.4	18.2	18.0	6,102
Fourth fifth	22.5	23.4	23.5	7,942
Top fifth	41.1	38.4	38.4	13,016
All families	100.0	100.0	100.0	6,669

This method of analysis, although informative, says nothing about the needs of the poor in terms of access to certain goods and services necessary for a decent standard of life.

The second device, the Lorenz Curve or Gini Ratio, is a mechanism for measuring the degree of inequality in a distribution. The Lorenz Curve shows the cumulated fraction of aggregate income plotted against the cumulated proportion of income receiving units (individuals, families, households, etc.) while the units of measurement are arranged in ascending order of income (Fig. 4).

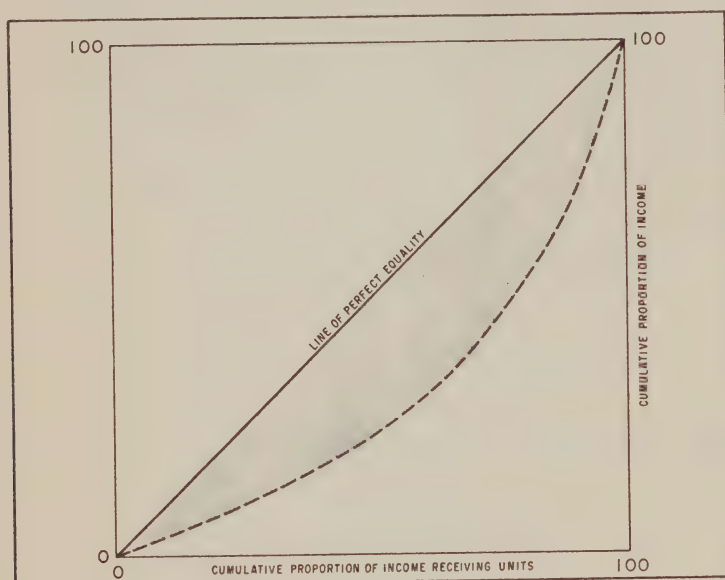


Fig. 4 The Lorenz Curve

If all incomes were equally distributed, the Lorenz Curve would coincide with the diagonal bisecting the square. If, however, only one unit received all incomes, the line would coincide with the bottom right hand corner of the square. Hence, the further the curve is away from the line of perfect equality, the more unequal the income distribution. The degree of inequality is expressed by the Gini Ratio, defined as the ratio of the area between the curve and the diagonal to the total triangular area enclosed by the lines of complete equality

and complete inequality.⁽⁴⁹⁾ A Gini Ratio of zero represents complete equality, whereas a ratio of one represents complete income inequality.

The utility of this device is demonstrated in the data given in Table 32.

TABLE 32⁽⁵⁴⁾

—Gini Ratios, Selected Years 1951-1961

Year	Gross income	Gross income less transfer payments	Gross income less taxes
1951.....	.390	.584	.369
1954.....	.388	.585	.377
1957.....	.397	.572	.378
1959.....	.386	.578	.367
1961.....	.385	.580	.366

These ratios show that the redistribution of income through transfer payments (pensions, welfare, etc.) has a definite effect on the levelling of income distribution. (Note that the ratio is 0.390 for gross income in 1951, whereas a ratio of 0.584 obtains for the same year when transfer payments are discounted.) This Table also shows that there was only minimal change in income disparities between the years of 1951 and 1961 which suggests that the impact of government policy aimed at the redistribution of income during that period was nonexistent. It would be very valuable for policy-making to have a breakdown on how the various components of government expenditure affect the Gini Ratios on both the long and short run.

Further insight into the effectiveness of the tax system as a redistributive device are to be found in comparisons between Canadian and foreign practice (Table 33).

TABLE 33⁽⁵⁰⁾

Percentage composition of taxes

COUNTRY	Direct tax on household	Direct taxes on corporations	Indirect taxes	Total
Austria	48	7	45	100
Belgium	52	6	42	100
Canada	30	16	54	100
Denmark	47	4	49	100
France	48	5	47	100
Germany	51	8	41	100
Greece ^a	36	2	62	100
Iceland ^a	29 ^b	—	71	100
Ireland ^a	23	9	68	100
Italy	57 ^b	—	43	100
Japan	38	21	41	100
Luxemburg ^c	58	10	32	100
Netherlands	62	8	30	100
Norway	53	4	43	100
Sweden	60	6	34	100
Switzerland	56	10	34	100
United Kingdom	45	8	47	100
United States	50	16	34	100

a. 1963—64.

b. Includes direct taxes on corporations.

c. 1963.

Since the most progressive systems are those with the highest direct and lowest indirect taxes, Canada rates rather poorly in the comparison.

4.6 Overview

The foregoing analyses, while important as first steps, fall far short of the needs of a comprehensive social report. Being entirely economic, they miss many important dimensions of poverty. These are the externalities, the disutilities which accrue to individuals and society. There is no mention of the loss of productive labour, the alienation, the psychic disutilities of the dole, the social degradation, the lack of power, the causally related incidence of crime and the barriers to mobility for the children of the poor. There is no appreciation of the bitter perception that the poor, as an apparently stable

proportion of our population, create a job market for penologists, criminologists, social workers, public health workers, crusading journalists, and other poverty mandarins; that they prolong the usefulness of day-old bread, secondhand clothes, cars and deteriorated buildings; that they also provide income for incompetent doctors, lawyers and teachers who might otherwise be an economic drain on society. (55) This is quite apart from their being used as a labour pool to absorb the fluctuations of an unstable marketplace.

The poor in an affluent society are not a political force. This makes it imperative that the articulate social forces, the legislators and the bureaucrats take it as their responsibility to champion the cause of the disadvantaged. An essential piece of ammunition in the battle for economic equity will be a report that convincingly exposes the total social costs of this cancer on society.

5. HEALTH AND ILLNESS

5.1 Introduction

As we review the exposition to this point and turn to the problems of health, we are struck by the close interdependence of these first few elements of the social slate. Crime, pollution, poverty and illness of individuals all have to do with the health of society. As a social organism, society has diseases analogous to those of the individual. Indeed, this is more than an analogy, for the diseases of man, with their high incidence among the poor, represent a common element among all the diseases of society identified above. Like theorems and axioms in a closed system of mathematical logic, they are both causes and effects. The failure to comprehend this essential circularity, the two-way interrelation of cause and effect, is at the root of most failures in the field of social planning. From the point-of-view of a participant within the system, and most planners are so-located, the logic of social relations appears as unidirectional, and the solutions are bound to lead to contradictions with the perceived solutions of others within the same milieu. To the extent that the planner can be of the system for empirical purposes, and outside the system for theoretical purposes, his efforts will be optimally rewarded. To operate in this equivocal way, the planner must, among other things, have global information, such as that provided by a comprehensive social report.

It is common to assess the health of a community on the basis of incidence of illness. This negative outlook is a direct consequence of past emphasis on curative rather than preventive medicine. Fortunately, there is a current trend towards the latter emphasis, institutionalized in the concept of total health-care systems. The goal of such systems and the society which sustains them is properly seen, not as cures, but as healthy individuals. While such a shift in viewpoint and emphasis may have complicated the problems of measurement, the vastly improved logic of the enterprise is a sufficient incentive for a vigorous search for measures of progress. For the

most part, indicators of effectiveness of specific health care systems are not as yet available, so we confine ourselves here to a conventional appraisal of the Canadian scene.

A nation exhibiting a low infant mortality rate, a low incidence of certain diseases, and high life expectancy is usually considered as healthy. From a limited perspective this is undoubtedly correct; however, such statistics exclude the all-important elements of mental and social health. Reflection therefore leads us to the conclusion that there is as yet no universally acceptable definition of health. However, such a definition may soon arise from the conception of contemporary researchers that physical, mental and social health are unified attributes which find their roots in the physical and social conditions of the total environment.

Support for this generalization is to be found in recent psychological and environmental research. Indeed, it is now possible to make significant statements about the relationship between heart disease, diseases related to hypertension, general mental illness, and the stress-producing and often physically poisonous environment we live in.

It has been well documented that exposure to a stressful environment eventually produces severe states of unresolvable tension and excessive privation⁽⁵⁶⁾. Such environments are characteristic of our contemporary cities. Norman Hawkins outlines the general process⁽⁵⁷⁾:

First is the fact that the vast majority of stress inducing agents are general in action. Secondly, the entire organism strives both for greater integration and for a counter-balancing action to neutralize the environment. And as the stress is prolonged, repeated, or reinforced by other stresses, the various functions of the organism go through a state of shock, a reorganization to maintain constant vigilance and resistance, and finally, through an accelerating decline which marks the state of systemic exhaustion.

Ian McHarg points out that both a superabundance and a random incidence of stimuli can be important stresses⁽⁵⁸⁾. When there are many stimuli, as in a city centre, and when these stimuli are for the most part meaningless, they act as noise. It becomes necessary therefore to exclude them, the process in turn giving rise to sensory deprivation. Studies of sensory deprivation have shown that it leads to hallucinations. Overloading by stimuli, on the other hand, leads to a succession of responses - omissions, errors, filtering, queuing, approximation, multiple channeling, and, finally, escape.

Noise has other negative attributes. It is estimated that any noise above 90 decibels in intensity and 4000 cycles per second in frequency subjects the heart to abnormal strain. Such noise levels are frequently reached and exceeded in our cities.

In relating health to the environment it is generally conceded that sulfur dioxide, carbon monoxide, lead and ozone are dangerous poisons in the air of our cities. Atmospheric ionization, on the other hand, has thus far received little attention. Contemporary researchers point out that positive ionization (which is a by-product of all combustive processes) has not only physiological but also psychological effects. Furthermore, positive ionization is now believed to be an important stressor.

Nominally clean air is negatively ionized whereas normal urban air is usually positively charged. These positively ionized pollutants immobilize the cilia of the bronchus, the net result of which is a reduction in the capacity of the organism to resist further effects of pollution. According to experiments conducted by the United States Navy, positive ionization induces tension and anxiety whereas negative ionization contributes to a feeling of well-being.

Evidently, we must opt for a wider definition of illness, recognizing the relationship between broad environmental issues and the incidence of mental and physical disease. While little research on this relationship has been carried out there are encouraging signs in the evolving

curricula and emphases of our medical schools that the profession has been sensitized to it. This trend and related ones in the social sciences are likely to lead to better information transfer and better planning within broadened concepts of health and health care delivery.

5.2 Review of Selected Indicators

Examination of the so-called macro-indicators of a population's health gives some insight into the development of health services over time. Continuing improvements in medical technology have contributed to significant reductions in mortality rates for the Canadian population. Table 34 gives the mortality rates by sex for Canada from 1930 to 1960, and shows as usual the significant difference in mortality rates for men and women.

It is possible to calculate the net effect of a decrease in mortality rate on the total population by adopting the methodology leading to Table 35. This table was calculated by projecting population size over time on the basis that the mortality rate is held constant. This population is then compared with the actual population and the difference between the two figures represents the net impact of the mortality rate decrease. The conclusion is that there are about 1,000,000 persons alive today in Canada who, but for the decline in mortality rate, would be deceased. For Canada this impact is significant, accounting for some 5 percent of the population.

TABLE 34⁽⁵⁹⁾
MORTALITY RATE

Year	Male	Female
1930.....	13.5	12.4
1940.....	11.8	10.2
1950.....	10.1	8.1
1960.....	9.3	6.6

TABLE 35⁽⁵⁹⁾

POPULATION OF CANADA 1961, IF 1926 DEATH RATE
HAD PREVAILED
(thousands)

Year	(1) Population (from Col. 7, previous line)	(2) Birth Rate (per 1,000 population)	(3) Computed No. of Births (1) x (2) 1,000	(4) Net Migration	(5) Total (1)+ (3)+(4)	(6) Computed No. of Deaths (1) x 11.4 1,000	(7) Hypothe- tical Population (5)-(6)
1926.....	9,717	24.7	240	29	9,986	111	9,875
1927.....	9,875	24.3	240	55	10,170	113	10,057
1928.....	10,057	24.1	242	69	10,368	115	10,253
1929.....	10,253	23.5	241	72	10,566	117	10,449
1930.....	10,449	23.9	250	47	10,746	119	10,627
1931.....	10,627	23.2	247	35	10,909	121	10,788
1932.....	10,788	22.5	243	1	11,032	123	10,909
1933.....	10,909	21.0	229	1	11,139	124	11,015
1934.....	11,015	20.7	228	-13	11,230	126	11,104
1935.....	11,104	20.5	228	-13	11,319	127	11,192
1936.....	11,192	20.3	227	-10	11,409	128	11,281
1937.....	11,281	20.1	227	-13	11,495	129	11,366
1938.....	11,366	20.7	235	-17	11,584	130	11,454
1939.....	11,454	20.6	236	-8	11,682	131	11,551
1940.....	11,551	21.6	249	-21	11,779	132	11,647
1941.....	11,647	22.4	261	-17	11,891	133	11,758
1942.....	11,758	23.5	276	-12	12,022	134	11,888
1943.....	11,888	24.2	288	-24	12,152	136	12,016
1944.....	12,016	24.0	288	-20	12,284	137	12,147
1945.....	12,147	24.3	295	-51	12,391	138	12,253
1946.....	12,253	27.2	333	3	12,589	140	12,449
1947.....	12,449	28.9	360	15	12,824	142	12,682
1948.....	12,682	27.3	346	42	13,070	145	12,925
1949.....	12,925	27.3	353	37	13,315	147	13,168
1950.....	13,168	27.1	357	17	13,542	150	13,392
1951.....	13,392	27.2	364	42	13,798	153	13,645
1952.....	13,645	27.9	381	173	14,199	156	14,043
1953.....	14,043	28.1	395	96	14,534	160	14,374
1954.....	14,374	28.5	410	131	14,915	164	14,751
1955.....	14,751	28.2	416	97	15,264	168	15,096
1956.....	15,096	28.0	423	64	15,583	172	15,411
1957.....	15,411	28.3	436	196	16,043	176	15,867
1958.....	15,867	27.6	438	135	16,440	181	16,259
1959.....	16,259	27.5	447	64	16,770	185	16,585
1960.....	16,585	26.9	446	48	17,079	189	16,890
1961.....	16,890	26.1	441	33	17,364	193	17,171
Actual population, 1961.....					18,238,000		
Hypothetical population, 1961 (Col. 7).....					17,171,000		
Increase due to mortality decline.....					1,067,000		

Life expectancy is another indicator of the health status of a population. In Toward a Social Report⁽⁴⁾ an attempt was made to supplement crude life expectancy rates by adopting a procedure for calculating the "expectancy of a healthy life", that is, expectancy of a life free of bed disability and institutional confinement. The authors conclude that there has been little or no improvement in the expectancy of a healthy life in the U.S. in the past 10 years. They also document the expectation of healthy life after 65, and again find little improvement in these rates in the past decade. Similar tabulations could be prepared for the Canadian population.

Measures of healthy life can in principle be refined beyond those utilized in Toward a Social Report. A. J. Culyer has suggested that an acceptable indicator of ill-health must measure both its intensity and duration. Intensity, he suggests may be thought of as having two dimensions, "pain" and a "restriction of activity". Although desirable, such refinements must be preceded by considerable theoretical and empirical work. All areas of human activity involving interpersonal comparisons of utility pose a series of exceptionally difficult problems for those aiming to develop comprehensive social indicators.⁽⁶⁰⁾ A particularly poignant and economically significant arena of measurement concerns prolongation of life at the extremity. An excruciating policy question, both for legislators and medical practitioners, has to do with achieving a rational approach to urban man's over-sensitization to the "death-fear", the disutilities of "terminal torture" and the excessive expenditures associated therewith.

While the immediately foregoing exposition indicates that the use of expenditures as a proxy for outputs is not in general to be recommended, their qualified use as an indicator of level of activity is justified. Fig. 5, from the Seventh Annual Review of the Economic Council of Canada shows the increase in expenditures from 1955 to 1967 and offers an estimate of expenditures for 1975.⁽⁶¹⁾ Table 36 presents a break-down of health care expenditures for selected years.

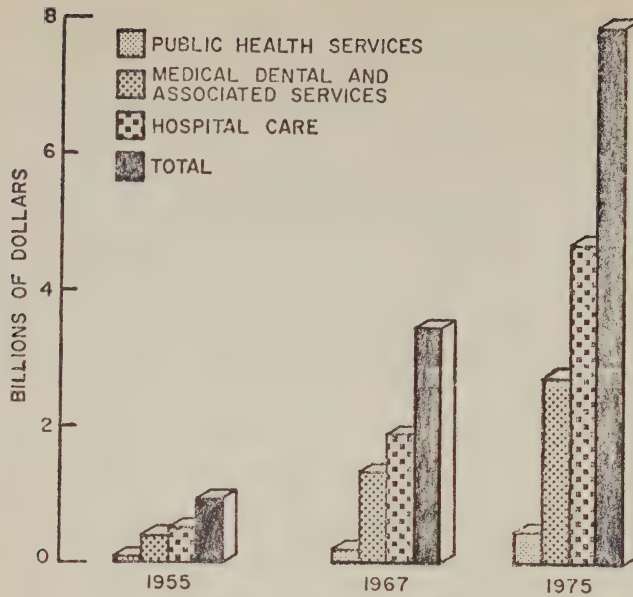


Fig. 5 Health Care Expenditures⁽⁶¹⁾

TABLE 36⁽⁶¹⁾

—HEALTH CARE EXPENDITURES

	1955	1960	1965	1966	1967
(Millions of dollars)					
Personal health care ¹	881	1,520	2,497	2,820	3,233
Hospital services.....	480	845	1,443	1,651	1,901
Physicians' services.....	208	355	645	605	686
Dentists' services.....	69	110	160	178	187
Prescribed drugs.....	60	101	170	190	240
Other health services ²	68	109	179	198	219
Public health services ³	72	105	138	158	196
Total expenditures ⁴	953	1,625	2,635	2,978	3,429

¹The sum of the indented items, whether paid for by government or by private sources. Expenditures on patent medicines, waste removal and sanitation are excluded.

²Including services of private duty nurses, nurses employed in other than institutions or doctors' offices, optometrists, opticians, podiatrists, psychologists, osteopaths and chiropractors, and physiotherapists and occupational therapists not employed in hospitals. Dietitians and veterinarians are not included.

³Including expenditures on administration, vital and health statistics, TB control, mental health (except hospitalization), public health nursing, laboratory services, alcoholic research foundations, food and drug inspection and control, control of communicable diseases, provision of facilities for training under the Health Resources Fund and Medical Research Council, and, in general, activities rendered on a public basis.

⁴Excluding capital expenditures.

Table 37 compares health care and hospital expenditures and hospital utilization for Canada and the United States.

TABLE 37⁽⁶¹⁾
—COMPARISONS OF HEALTH CARE AND HOSPITAL
EXPENDITURES AND HOSPITAL UTILIZATION, CANADA AND
UNITED STATES

	Canada	United States
	(Percentage)	
Expenditures as Percentage of Gross National Product		
Health care ¹		
1955.....	3.2	3.8
1965.....	4.7	4.8
Hospital		
1955.....	1.8	1.5
1965.....	2.8	2.0
	(Average annual percentage increase)	
Growth of Hospital Expenditures and Use, 1950-67		
Hospital expenditures.....	15.6	10.3
Population.....	2.3	1.6
Use per person.....	1.5	1.4
	(Days)	
Average Length of Stay in Hospitals		
1950.....	10.4	8.1
1967.....	10.2	8.3

¹Excluding expenditures on nonprescription drugs.

We refer the reader to the source for interpretations of these tables and the clear evidence of an explosion in expenditure. The Economic Council is currently attempting to refine such measures through the development of composite weighted indicators. (62)

5.3 Social and Mental Health

Two dimensions of the present subject which are often neglected are social and mental health. While the costs attributable to the alienation and pain associated with mental illness are as difficult to measure as is physical pain,

indicators such as incidence rates, days off work, number of hospital beds occupied and costs can be gathered. However, the data which is available is often confusing due to a continuous change in definitions, classification procedures, and diagnosis. Such difficulties will plague the social reporter in this arena for a long time to come.

Quantitative studies on social health are now being undertaken and we can be optimistic about continuing advance due to the encouragement provided by the current emphasis on ecology and the environment.

A particular study carried out on the city of Philadelphia illustrates the insight gained through this type of inquiry ⁽⁴⁶⁾ (Fig. 3 is from the same reference). Data was collected on incidence of social, physical, and mental health. In addition, information was compiled on economic factors, ethnicity, housing quality, air pollution, and density. The data was then divided into three categories -- highest, intermediate, and lowest incidence.

When eight factors of physical disease were examined, it was found that high incidence strongly focussed on the centre of the city and diminished as the distance from the centre increased. The diseases included were heart disease, tuberculosis, diabetes, syphilis, cirrhosis of the liver, amoebic dysentery, bacillary dysentery, and salmonellosis.

For social disease, the factors tabulated were homicide, suicide, drug addiction, alcoholism, robbery, rape, aggravated assault, juvenile delinquency and infant mortality. Again, a maximum concentration in the centre of the city was revealed.

The study was also extended to the incidence of mental disease, and here a more diffuse spacial pattern was observed than for physical and social disease. From this data, it was possible to prepare a map of the distribution of the environments of pathology for the entire city. This was then related to other maps drawn up to demonstrate the distribution of ethnic groups, pollution, income, poverty, unemployment, housing quality, overcrowding and illiteracy. It was

found that the areas of poverty were at the heart of the concentration of disease incidence whereas those areas displaying high incomes were relatively healthy. Furthermore, the areas of relative health were also free of pollution. The pattern that emerged on the whole was clear — the centre of the city is the heart of pathology for the region. Besides the extremely high correlation of environmental disease with socio-economic status, population density emerged as of paramount importance. This finding is in keeping with the proposition that increase in density results in an increase in social competition and the creation of a more stressful environment.

With all their quantitative limitations such studies give a good indication of the many factors to be considered when assessing the health of a nation. It should be further emphasized that workable data for this type of analysis is not generally available in Canada and that for the most part, the only way that it can be obtained is through extensive survey research.

6.4 Potential for Improvement of Health Care Systems

The potential for improvement is usually measured by comparisons made between and within countries. Comparisons of life expectancy between test groups within the same country provide a measure of the extent to which existing knowledge and techniques when optimally applied can extend life and at the same time a measure of the relative effectiveness of the delivery of health-care to the test groups in the population. For example, the infant mortality rate among Eskimos is more than 10 times the infant death rate for the population as a whole. (63)

Some comparative data on health indicators is presently available by province for Canada. Although such aggregate data would be more useful when coupled with comparisons between different socio-economic groupings it is nonetheless instructive.

Table 38, for example, illustrates the differences in mortality rates by province. Impressions of the availability of health facilities in the respective regions can also be gained by examining the population-physician ratios given in Table 39. There is a fair positive correlation between these two sets of data. It should be noted that the population-physician ratios are deceptive in that they do not indicate the volume of medical services rendered or the scope and quality of the physicians' work. Nor does the ratio allow for the social, economic, and physical characteristics of the population served.

It is useful at this point to discuss the health status of different groups in the population. While regional differences in health care have received a great deal of attention, analytic data on the relationship between ethnic origin, income, occupation, etc., have not been offered in spite of the fact that American research indicates that there are severe differences in health status between social groups. No adequate assessment of the availability of resources, the use of resources, or the effectiveness of medicare schemes can be arrived at until this kind of data becomes available.

It is often argued that there is an overall shortage of doctors, and this in spite of the fact that the number of applicants to medical school turned down each year by Canadian schools is very high. It was estimated by the Commission on Health Services that another 7,500 physicians are needed by 1991 if we are to maintain the 1961 population-physician ratio.⁽⁵⁹⁾ Data on emigration shows that a considerable proportion of doctors trained in Canada emigrate to more lucrative practices in the United States — as of 1962, there were 3,125 Canadian-trained physicians in the United States (see Table 40). This figure seen in relation to the output of our medical schools represents the equivalent of all the graduates of all our medical schools for a four-year period.

While it is generally conceded that there is an overall shortage of medical personnel, a blind belief in the value of more — more doctors, more nurses, more hospitals — may be misplaced. Innovations such as nurse practitioners,

TABLE 38^{(59)*}

MORTALITY RATES, CANADA AND PROVINCES, 1960

Province	Crude Rate	Standardized Rate*
Newfoundland.....	6.6	7.8
Prince Edward Island.....	9.3	7.2
Nova Scotia.....	8.4	7.6
New Brunswick.....	7.8	7.7
Quebec.....	6.9	9.0
Ontario.....	8.5	8.1
Manitoba.....	8.3	7.4
Saskatchewan.....	7.5	6.7
Alberta.....	6.9	7.4
British Columbia.....	9.2	7.5
Yukon.....	6.9	7.5
Northwest Territories.....	14.2	14.7
CANADA.....	7.8	7.9

* Standardized to Canada 1956 Census population.

TABLE 39⁽⁵⁹⁾

PROVINCIAL POPULATION-PHYSICIAN RATIOS, 1911-1961

Province	1911	1921	1931	1941	1951	1961
Newfoundland.....	—	—	—	—	2,524	1,991
Prince Edward Island.....	1,306	1,309	1,397	1,418	1,342	1,149
Nova Scotia.....	1,206	1,147	1,153	1,350	1,094	1,044
New Brunswick.....	1,253	1,448	1,517	1,693	1,445	1,314
Quebec.....	1,003	1,065	1,046	1,054	990	853
Ontario.....	828	848	872	903	857	776
Manitoba.....	1,065	1,095	1,051	1,108	926	823
Saskatchewan.....	1,298	1,445	1,579	1,700	1,278	973
Alberta.....	1,014	1,073	1,256	1,320	1,118	982
British Columbia.....	945	862	952	1,010	847	758
CANADA.....	970	1,008	1,034	1,072	976	857

TABLE 40⁽⁵⁹⁾MIGRATION OF PHYSICIANS INTO AND OUT OF CANADA,
1946-1961*

Year	Immigration		Total	Emigration to U.S.A.	Difference Between Immigration and Emigration	Net Loss to U.S.A.
	From U.S.A.	From Other Countries				
1946.....	—	56	56	—	56	—
1947.....	—	81	81	—	81	—
1948.....	—	95	95	—	95	—
1949.....	—	78	78	—	78	—
1950.....	—	68	68	260	-192	-260
1951.....	—	166	166	173	-7	-173
1952.....	—	293	293	186	107	-186
1953.....	55	347	402	105	297	-50
1954.....	39	272	311	135	176	-96
1955.....	33	300	333	127	206	-94
1956.....	29	386	415	96	319	-67
1957.....	46	589	635	265	370	-219
1958.....	52	342	394	179	215	-127
1959.....	66	373	439	229	210	-163
1960.....	84	357	441	262	179	-178
1961.....	67	378	445	296	149	-229
TOTAL.....	471	4,181	4,652	2,313	2,339	-1,842

*Data for the period 1946 to 1952 have been estimated by the Department of Citizenship and Immigration.

community health clinics, increased use of medical aides and preventive medicine, all of which could improve the efficiency of health care delivery, may obviate the need for an increase in number of conventional practitioners. Unfortunately, "more" is easily measured, and it reinforces existing procedures and discourages innovation. For these and other reasons, indicators which deal only with numbers of physicians or nurses must be interpreted very critically.

In assessing the potential for improving the health of our population it is also useful to compare indices of health by different nations. According to the data represented in Table 41 Canada ranks only ninth in life expectancy. An increase in the life expectancy by three years would require the total prevention of diseases like cancer or heart disease or, ironically enough, the effective prohibition of smoking.

Table 41 shows further that although there was relative improvement in infant mortality rates from 1960 to 1968, Canada is nonetheless falling behind other nations in this measure of health. Despite Canada's ascendancy as measured by economic indicators, as of 1968 it still ranked 13th on the incidence of infant mortality (Fig. 6).⁽⁶⁴⁾ The Royal Commission on Health Services in Canada noted that one of the most significant issues emerging from their analysis of health care in this country is the enormous gap between our scientific knowledge and skills and our organizational and financial arrangements for applying them to the needs of men⁽⁶²⁾.

The future effectiveness of health services in Canada will depend on the effectiveness of trained personnel, on medical research and upon the effective delivery of new techniques and knowledge. Social indicators and cost-benefit analyses should be developed to monitor the state of each of these factors as well as the general efficiency of the health care system.

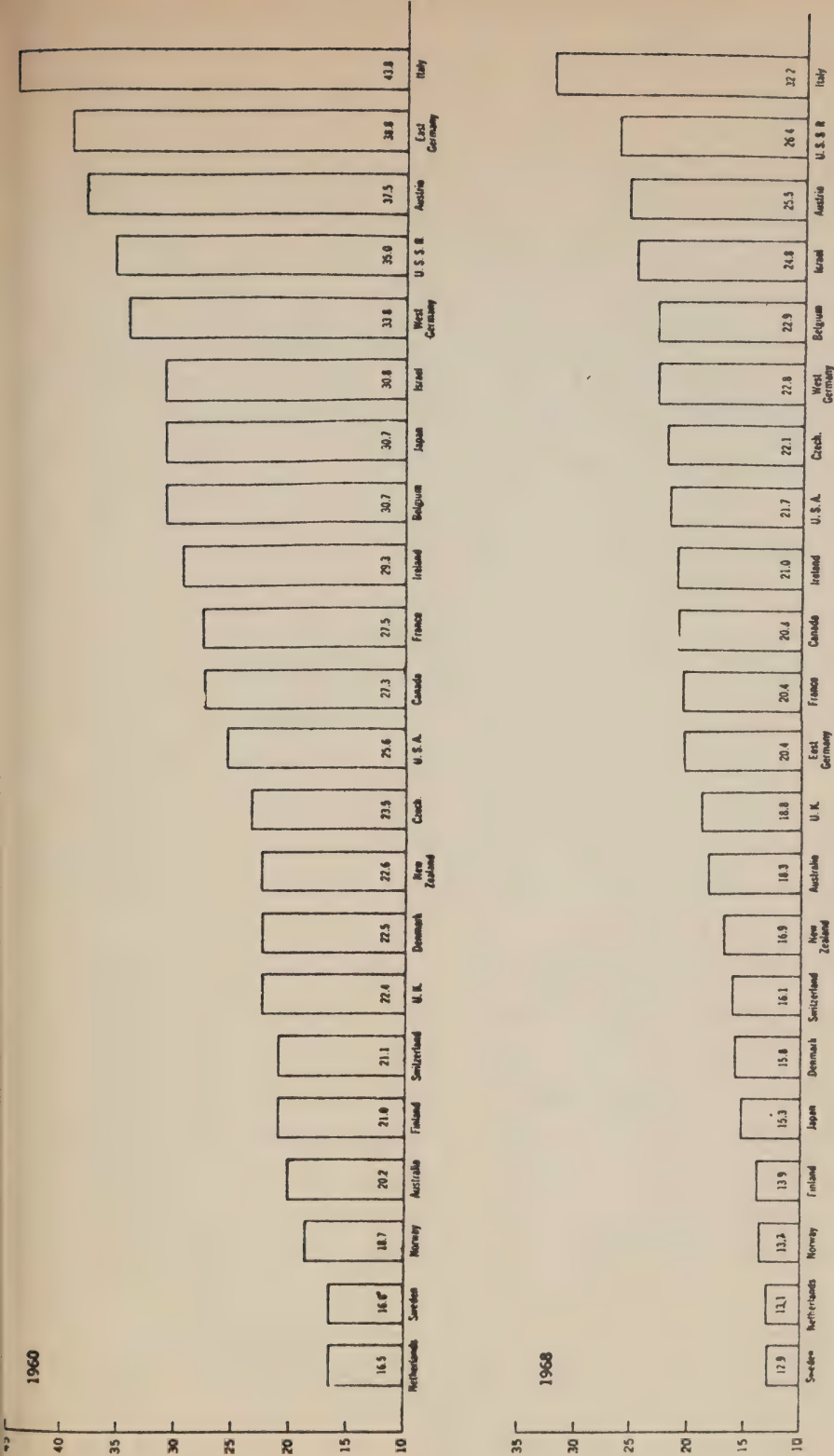
The incidence of the following activities seem relevant to such developments: incentive plans for economic efficiency, alternatives to hospitalization, insurance schemes which encourage the use of preventive measures, co-ordination

TABLE 41⁽⁶⁴⁾*Expectation of life at birth in 22 industrial countries*

<i>Males</i>			<i>Females</i>		
<i>Country</i>	<i>Years of life</i>	<i>Date</i>	<i>Country</i>	<i>Years of life</i>	<i>Date</i>
<i>Sweden</i>	71.6	1961-1965	<i>Netherlands</i>	76.1	1966
<i>Netherlands</i>	71.1	1966	<i>Norway</i>	76.0	1961-1965
<i>Norway</i>	71.0	1961-1965	<i>Sweden</i>	75.7	1961-1965
<i>Israel*</i>	70.4	1967	<i>France</i>	75.4	1966
<i>Denmark</i>	70.1	1965-1966	<i>Denmark</i>	74.7	1965-1966
<i>Switzerland</i>	68.7	1958-1963	<i>United States</i>	74.2	1967
<i>East Germany</i>	68.5	1963-1966	<i>Australia</i>	74.2	1960-1962
<i>New Zealand†</i>	68.4	1960-1962	<i>Canada</i>	74.2	1960-1962
<i>Canada</i>	68.4	1960-1962	<i>United Kingdom</i>	74.2	1963-1965
<i>Japan</i>	68.4	1966	<i>Switzerland</i>	74.1	1958-1963
<i>France</i>	68.2	1966	<i>New Zealand†</i>	73.8	1960-1962
<i>Ireland</i>	68.1	1960-1962	<i>Czechoslovakia</i>	73.6	1966
<i>United Kingdom</i>	68.1	1963-1965	<i>Israel*</i>	73.6	1967
<i>Australia</i>	67.9	1960-1962	<i>Japan</i>	73.6	1966
<i>Belgium</i>	67.7	1959-1963	<i>Belgium</i>	73.5	1959-1963
<i>West Germany</i>	67.6	1964-1966	<i>East Germany</i>	73.5	1963-1966
<i>Czechoslovakia</i>	67.3	1966	<i>West Germany</i>	73.5	1964-1966
<i>Italy</i>	67.2	1960-1962	<i>Austria</i>	73.4	1967
<i>United States</i>	67.0	1967	<i>Finland</i>	72.6	1961-1965
<i>Austria</i>	66.6	1967	<i>Italy</i>	72.3	1960-1962
<i>Finland</i>	65.4	1961-1965	<i>Ireland</i>	71.9	1960-1962
<i>Argentina</i>	63.7	1960-1965	<i>Argentina</i>	69.5	1960-1965

*Jewish population only.

†European population.



*Deaths under one year of age per 1,000 infants born alive.

† Data for Sweden, Australia, and Belgium are for 1967, and data for the Netherlands, Finland, Japan, and New Zealand are for 1969.

Fig. 6 Infant mortality rates for 22 industrial countries, 1960 and 1968 (64)

among institutions, flexible certification procedures, wider use of medical aides, team approaches, experiments in the delivery of health care such as consumer-organized group practices, planning of coordination at governmental and regional levels and increased research on the socio-economics of health care.

One of the principle recommendations of the Royal Commission on Health Services was for the development of a comprehensive system of health statistics which would enable analysts to make more informed statements about the distribution of health care in this country.

5.5 The Role of Trained Personnel

The Royal Commission on Health Services pointed out that the most important factor upon which the quality of health care depends is the knowledge, skill, and dedication of the professional doctor.⁽⁵⁹⁾ Every facet of health care is controlled by him, and most health services and their costs are the result of independent decisions of the medical profession. It seems reasonable, therefore, that patients or potential patients should be informed as to how doctors are trained, the way in which practices are organized, and how the personal views of the doctor may influence the decisions he makes about health care.

A survey conducted at eight American medical schools showed that certain attitudes are predominant among students studying for medicine⁽⁶⁵⁾. Few expressed an interest in the critical area of medical administration or in jobs which would necessitate the integration of skills possessed by others. Few were interested in public health or medical research. Furthermore, medical schools in the past have placed little emphasis on the integration of disciplines, so, for the most part, the medical student has been isolated from others in the academic community. The net result of this process is that doctors are often ill-equipped to deal with many of the medical problems of social origin that turn up in their offices. Most receive little training in the social sciences, their knowledge of social and political matters is often archaic and the majority have little contact

with the community, tending to socialize predominantly with members of their own profession. According to the Task Force on Future Arrangements for Health Education (66)

Doctors have created the system, it is they who decide which patients will be treated, where and under what conditions, and for what fee, who enters hospital, what therapy and for how long, what drugs will be purchased and in what quantities. It is recognized that the attitudes of doctors are conditioned by their experiences as they go through medical school. The physician trained in the atmosphere of the university centre often fails to see the challenge of the surrounding communities. The relative slowness of the university health sciences centres to make their educational programmes relevant to a balanced spectrum of health care has made it difficult to graduate physicians with the appropriate attitudes to provide the leadership in solving community health problems.

A similar statement can be made about the arrangements for the training of other health care personnel such as dentists and nurses. Future social indicators must speak among other things, to the questions: Is there emphasis on the team approach, on cost-benefit relationships, and on relevant material from the social sciences and systems analysis?

The dominant attitudes of the medical profession lead doctors to opt for independence in their work and a high income in spite of the fact that group practice is considered better for the patients because it gives rise to a more critical medical environment. The values which come to dominate solo practice are akin to those adopted by independent businessmen. It is argued, however, that health services are not subject to the normal self-corrective dynamics of the market system. To quote from Toward a Social Report,⁽⁴⁾

The most significant divergence is the very unpredictability of illness for the individual. The demand for health services, unlike that for food and clothing, is not steady; it is irregular and moreover is associated with a risk of impairment or death... Since the consumer cannot test the product before he consumes it, and may not ever know what he has got after he has consumed it, he must put his trust in the dentist or the physician.

Most doctors continue to operate their own private businesses in publically owned workshops (hospitals) wherein they are empowered to set their own prices without the moderating influence of either negotiation or a market system.

5.6 Health Care and Education

A number of recent studies have related health standards to a selection of social classifiers (age, sex, education, etc.). For nations in the Western Hemisphere improved life expectancy has depended far less on medical advances than on the rise of the literacy rate⁽³⁾. Indeed, a recent U.S. study suggests that education is a better investment than medical science for reducing mortality⁽⁶⁾. Furthermore, it has been established that members of high-status (and therefore high education) occupations live longer. This is undoubtedly connected with the perception that there is a relationship between social class and the use of medical services. It is one of those sociological ironies that the middle and upper income groups benefit most from medicare programs. Being on the average better educated and better informed they are equipped to take full advantage of such social services.

Accepting the premise that education is a key activity in the promotion of the health of the community, planners are duty-bound to continually examine and up-grade the health education programs in the schools. The inculcation

of general physical fitness habits, currently being undermined by the emphasis on competitive sports, would appear to be a priority item. The counteraction of the prevalent ethos which leads to use of the human body as a machine which can be repaired by specialists on demand is also essential.

In conclusion, one pathway towards an effective and efficient health-care system is through an educational program for the young which emphasizes moderation, conservation and prevention. In this context ever-expanding medical budgets may conceivably be interpreted as negative indicators of progress towards the achievement of universal health.

6. ADAPTABILITY - SOCIETAL TRANSFORMATIONS AND MOBILITY

6.1 Introduction

The Marxist concept of societal dynamics based on the resolution of class conflict has been supplanted within this century by analyses based on the concepts of "stratification" and "social mobility". While the modern sociological description is more benign than the classical one, it is nonetheless equivalent, and accordingly suffers from a cloying web of ideological preconceptions.

The social reporter must ultimately try to penetrate through the preconceptions to the core of process and interaction which makes up the physical dynamics of society. In this chapter we make a first attempt at such a penetration by stripping the terms "stratification" and "social mobility" of their ideological taint. We do this by temporarily substituting the terms "classification" and "diffusion" for "stratification" and "social mobility", respectively.

The number of overlapping ways of classifying the peoples of a state or society, while very large, is finite. The significant sociological divisions while also large in number, are nonetheless tractable: age, sex, colour, division of labour, inheritance, country of origin, income, intelligence, education, etc. Such classifications become dynamically and sociologically significant only when an analysis is made of the extent to which various classes share the same individuals. For example, the class of persons designated as "1970 Ottawa University students who are Ontario residents" can be sub-divided into the sub-classes Anglophone and Francophone, and according to family incomes in the ranges \$0-4999, \$5,000-9999, \$10,000-14,999, \$15,000-19,999, \$20,000-24,999 and \$25,000 up, and then charted as in Fig. 7. The result of such a classification procedure is clearly significant from the sociological point of view.

Now various pairs or groups of classes have varying degrees of mutual

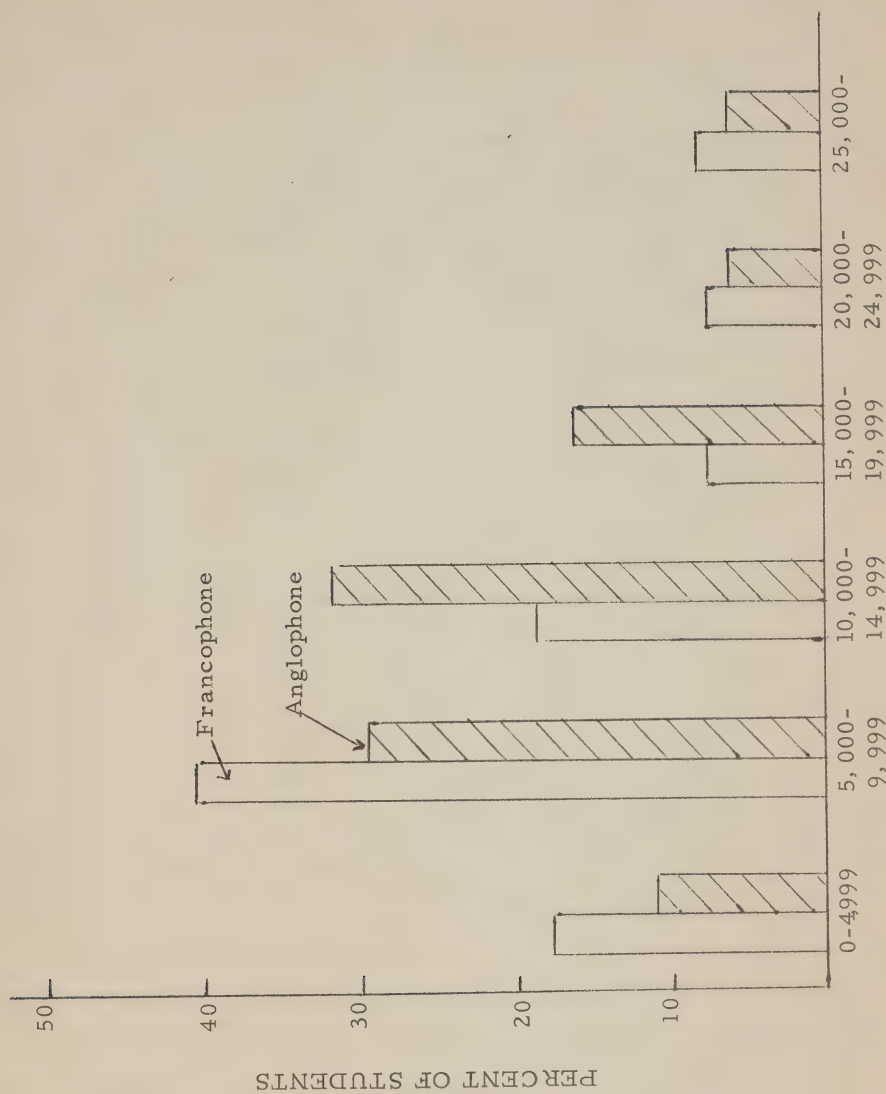


Fig. 7 Distribution of Students at University of Ottawa by Language and Family Income, 1970.

penetrability in time by individuals. E.g., the classes male and female have zero penetrability. The classes Francophone and Anglophone have a very slow, but measurable, rate of mixing. The classes "sons of industrial workers" and "upper quartile of income" may have, on the other hand, a substantial rate of penetration. It is this process of mixing of individuals between classes which we recognize as fundamental and designate as social diffusion. In an absolutely stable society, diffusion and counter-diffusion rates are exactly equal so the class structure does not change. In other words, the diffusion process is completely random. Ideally, intrinsic diffusion rates (of this random sort) should be measured under stable conditions.

In an evolving society biased (or directional) diffusion rates necessarily lead to redistributions of class occupancy. Such biases may originate with external forces (information from other societies, changes in resource potential, etc.,) or from the spontaneous generation and growth of new classes in competition with the old (e.g., the class of researchers, trade union members, student power groups, women's liberation, etc.). By and large, the "mutative" events which are the embryos of a change in class structure are acquisitive in character, often but not always leading to an increase in wealth of the whole, as well as a redistribution of wealth between classes. These are the elements of the process known as progress. The biased and un-biased (intrinsic) diffusion processes which accompany such externally or internally induced mutations are moderative in character, tending to restore the balance of diffusive forces among classes. These are the elements of the processes promoting equalization.

It is to be noted that our framework includes the concepts of stratification and social mobility, both of which imply certain hierarchies of classes and preconceptions about the inherent values of membership in given classes. Now there is nothing wrong with assuming hierarchies of classes, for they do in fact exist, but it is wrong to ignore the many horizontal classifications since they may often be the most important. For example,

in modern industrial relations the union-management dichotomy, describing a horizontal competition between roughly equal-powered classes for a share of a particular good, is probably more significant in societal dynamics than the hierarchical employer-employee relationship which involves the same individuals.

"Social mobility" often carries the modifiers "upward" or "downward", implying a relative value assignment to certain classes. Such value pre-assignment is dangerous and quite unnecessary from the analytical point of view. Empirically, "social mobility" is equivalent to what we have called "biased diffusion", that is, diffusion in the presence of evolution of class structure due to internal or external "mutation". By definition it vanishes in the stable societal state. Although, social mobility contains (and is probably proportional to) what we have called the intrinsic (or unbiased) diffusion rate, it is theoretically much more complicated because of its dependence on the magnitude of the unbalanced social forces in the system.

There is some tendency to use measures of social mobility as indicators of equality of opportunity. At best this association is circular and at worst it is downright misleading. As the earlier discussion made clear, social mobility in its fundamental sense is the process whereby unbalanced forces are equalized. Balanced forces, when achieved in a given society, may be very far from the concept of "equality of opportunity" held by many of its citizens.

For example, within the present value system it is argued that increased accessibility to post-secondary education for the offspring of the poor leads to upward mobility (greater access to resources) for these persons and therefore greater equity in society. The fact that subsidies which lead to increased accessibility of this kind are strongly discriminatory against poor youths who do not have the specified intellectual endowment is ignored. Indeed, there is a sense in which the meritocracy as a whole is strongly discriminatory against at least half of our population.

Progress towards some ideal concept of universal equity requires many mutative as well as moderative steps. Adaptability, which is inclusive of the terms mutatability and mobility, is an essential characteristic of systems capable of reaching some yet undefined concept of perfect equity. Mutatability is closely related to those societal characteristics designated as pluralistic, open, participative and responsive. We will briefly deal with this relatively unexplored (and perhaps politically explosive) arena in the immediately following section of this chapter.

The succeeding sections have to do with current empirical approaches to the characterization and quantification of social mobility. We approach these results in the light of the qualifications introduced above.

6.2 Participation, Openness and Responsiveness

The general weakness of the social sciences in the arena of dynamics is epitomized by the lack of an extensive literature on adaptability. Consider, for example the ambiguity of the three common indicators espoused by the press and the Chamber of Commerce: voter participation, newspaper readership and membership in organizations. Consider how many people buy newspapers only to read the comics, how many people base their vote on convention rather than a serious consideration of political issues and how many people belong to organizations in which they take no active part.

At best, voter participation and newspaper readership indicate a desire to be informed and participate in a society's social and political life; they represent no guarantee that people do so effectively.

In seeking a conceptual framework for "hard" indicators of performance of the dynamical or political process of change we need to more precisely define the terms "participation, responsiveness, and openness". We surmise

that participation and responsiveness both relate to the satisfaction of needs: satisfaction through either the provision of facilities (resources) or decision-making (power). The drive to satisfy some need is the usual basis for participation in politics (even if the need is perceived as a political cause) and the response of the political process may be such as to satisfy that need even if the need is one demanding change of the political process itself.

Fundamental here is the satisfaction of needs through the exercise of power, for it is relative power that ultimately determines the distribution of resources. Openness in this context refers to how easily needs are defined and popularized and how rapidly they are met. An adaptive society is one which encourages the free interplay of all existing and potential power centers. It is only such free interplay that can produce real progress towards an elusive concept of true equity. The most effective, and indeed the logical form of such interplay, involves the withholding of services or resources, for it is by this empirical device, and this alone, that the value equation for such services and resources can be established. For example, in New York City it has now been established that the value to the residents of the contribution of a street sanitation worker is about the same as the value for a public health bureaucrat, and the rewards will henceforth be commensurate. In other words, the dynamic process has removed an inequity deriving from the artificial value system imposed by the meritocracy. As a corollary to the foregoing we suppose that openness, responsiveness and participation will be favoured in direct relation to the decentralization of power.

Applying these concepts to the political process we recognize three centres of power. The first is the formal structure of decision-making: the institutions of legislation in society. The second is the adjunct structure of power, including institutions such as political parties and the civil service. Both of these latter structural elements - ultimately controlled by the electoral process - possess facilities and power to which individuals desire access.

They also possess certain "feedback" mechanisms (such as government commissions) which specifically allow, or attempt to provide with the help of the mass-media, participation-response. The third center of power involves the "individual" in various roles - at the ballot box, in ad hoc groups, in lobbies and in political parties.

The formal institutions of decision-making based on representative democracy place the burden upon the individual elected member of parliament (MP, MLA or alderman) to assure that participation and responsiveness are effective within the political process. The widespread cry for "participatory democracy" indicates some dissatisfaction with the members' effectiveness in this role. Periodic elections and active engagement at such times no longer satisfy many people as their only mode of participation in the political process. Certainly there are limitations on the effectiveness of the MP as a channel for desires to participate. The concentration of power within the executive branch of most governments and the concentration of knowledge and expertise within the "politically neutral" public services are both factors which limit the MP's role as true representatives of the people. Despite these limitations, the MP is the crucial link in the western system of representative democracy. His performance must therefore be regarded as a key indicator in this arena. How well does the MP represent the views of his constituents (participation) and how much influence does he have on government policy (responsiveness)? It is at this point we are forced to recognize the explosiveness of the issue which we are presently raising.

Does there exist a party in power which is prepared to support, finance and publish an objective and detailed assessment of all legislators on the basis of their response to the articulated demands of their constituencies, of content analyses of their work in and out of their ridings, the parliament, and in party conferences, of their frequency and effectiveness of contact with individuals and organizations, of their influence on major policy and their dealings with and responses to the various lobbies? The answer is perhaps

the most telling absolute measure of the openness and responsiveness of this particular society.

The role of the civil service in the process of change is ambiguous because of its supposedly neutral nature. Its responsiveness is necessarily circumscribed by the policies of the government of the day and its own base of recruitment. Porter shows a clear pattern of recruitment which inevitably leads to a certain bias.⁽⁵²⁾ Of the federal bureaucratic elite, as he defined it in 1965, 78.7% had university degrees and 43.6% had postgraduate training; only 13.4% were French Canadians, though French Canadians compose about a third of the general population, and most other ethnic groups "are scarcely represented at all"; regionally, Ontario was over-represented in the elite, and all other provinces were under-represented; religious affiliation showed over-representation of Anglicans and members of the United Church while the Roman Catholic Church is very much under-represented; the social origins of the elite were such that 86.8% came from the middle and upper classes, a mere 13.2% having risen from strata below the middle-class.

The career pattern of civil servants, referring both to where the individual worked before and after leaving the service and to the channels for advancement within it, constitutes an indicator of accessibility to the service and the chances of influencing it. Porter's data indicates that only about half the civil servants within the elite were career men; the others entered it from outside the service, principally from the business and political worlds. Are these persons sensitive to the pressures coming from various parts of the society - from the trade unions, for instance? A specific indicator of the effectiveness and responsiveness of the bureaucracy is to be found in the degree of clamour for, and frequency of, establishment of the post of ombudsman in various levels of government.

One of the most important factors constraining the behaviour of career servants will be their perception of "routes to the top". Porter shows that chances for advancement increase when the civil servant is close to policy

forming agencies such as the Privy Council Office. Does this tend to make the civil servant more conservative in outlook? Is there a tendency for a perpetuation of certain ways of looking at problems within the civil service?

Other important measures of responsiveness lie in the degree to which the career pattern of civil servants sensitizes them to important regional and ethnic problems. To what extent do career patterns demand geographic mobility, special language training and so forth? Other useful indicators of the potential responsiveness of the civil service can be found in the degree of cross-fertilization within it. To what extent do civil servants typically move through many departments of the service, thus tending to develop an understanding of a broad range of problems?

Political parties are the most evident means by which citizens can participate in the political process. As individuals they can join and attempt to influence existing parties or, in principle, form their own. The time-honoured debate about working inside or outside the system centre around the question as to whether it is possible for individuals and groups - especially those with dissident, radical or innovative beliefs - to influence the party and ultimately, society as a whole.

Effective participation in political parties inevitably involves attempts to change party policy. Two considerations of importance are the extent to which the membership can and does influence policy and the extent to which that policy is binding on the parliamentary party. Since all parties articulate policy through conferences, it is the structure of such conferences which must be examined. Particularly important is the process whereby resolutions are brought forth to the conference. Do policy resolutions come from the membership or are they largely the creation of the party hierarchy? How much opportunity is there for the discussion of dissident views, that is, those not identical with the views of the party leadership? Answering such

questions involves not only an examination of the content of policy conferences, but also an analysis of their rules and procedures. The degree of "openness" could be recognized in the various rules for debate, the time allotments for different subjects, the authority of the chairmen and their method of appointment.

The usual ambiguous relationship between policy specified by the membership and that acted upon by the party's parliamentary wing has often led to dissension within political parties. Two indicators of parliamentary accountability could be established. One would be a content analysis relating membership-approved policies to those of the parliamentary party as represented in its legislation, speeches and so on. A second indicator could be found in the performance of the leadership of the parliamentary party at the membership conference.

Adaptability, as here defined demands an effective three-directional information flow: between the people and the government, between the government and the people and among the people themselves.

The political process as a whole constitutes a flow of information from the people to the government. Elections, for instance, are information transfer systems, as are public opinion polls. Government commissions also function primarily in this role. Although they are charged with determining the facts of a given case they often function as a tool for sampling the feelings of the public and pressure groups on a given question. How effective are such commissions? A precise determination of which commission reports were acted upon, and which were not, would provide key indicators of government responsiveness. Analyses comparing recommendations made by other groups, commission recommendations and subsequent legislation, would show the relative weight given to the views of different sections of society.

Governments provide information about society as a whole (Statistics Canada material, for instance) and about their own activities and those of the

legislative structures, largely as channeled through the mass media. The information currently generated about the society is so vast, and intended for such a variety of uses, that establishing general indicators here would be difficult. However, at least two important questions could be investigated: that of confidentiality and that of "level of expression". What are the standards of classifying information within such agencies as Statistics Canada and the Departments of Manpower, Consumer Affairs and Finance? What distinctions are made between other government agencies, the mass media and individuals in providing access to information? How co-operative are government institutions in supplying data for independent research programs?

"Level of expression" speaks to the communicability of government-released information and the extent to which it helps the general public participate and make effective decisions in both domestic and political matters. A case study for the first social report should be concerned with the function and effectiveness of the new Department of Consumer Affairs.

Information about the performance of the legislative structures, government departments and other institutions is largely communicated via the mass media. Questions of particular interest here have to do with the political bias of the media, the assumptions lying behind their reporting, the clarity with which events are reported, the degree of background information assumed in the reader and the preconceived notions as to what interests the readership.

Perhaps the most vital element of the information transfer process is the degree to which members of the community can broadly communicate with each other about common needs. The most pertinent indicators here would assess the extent and the objectivity of press reporting on citizen's and radical groups, the issues which the latter raise and the effectiveness of their own publishing efforts.

A related indicator is the degree to which people trust the media. This could be evaluated through opinion polls and by the examination of the views of particular citizens and representatives of the citizen's groups whose activities are described in the media. Do they feel their stories have been distorted? Finally, a detailed examination of the formal policy directives and informal restraints that journalists in the media feel they are subjected to would illuminate the limitations imposed on communication between citizens about their common needs.

We conclude this section by noting that one of the strongest positive indicators of advance in the arena of participation, openness and responsiveness would be the undertaking by governments in Canada of social reporting in general, and particularly on this very sensitive part of the social slate.

6.3 Social Mobility

As indicated in the introduction, we define social mobility as the rate of unbalanced diffusion of individuals between social classes, a quantity which is non-zero only when the class structure is unstable due to external influences or to the evolution or devolution of class structure within society. To avoid ideological bias we regard the qualifiers "upward" and "downward" as arbitrary. That is to say, there is nothing absolute in the assignment of the term "upward" to net diffusion in the direction "electricians" → "bureaucrats" since we can easily envision a society with a class and economic value system which reverses this order. When we subsequently use the term "upward" in this context we mean a net flow or diffusion in the specified direction, and that there exists some consensus in our particular society that this particular direction is preferable. The assignment of absolute directionality is quite unnecessary to a complete analysis of social dynamics.

Comparison of Intergenerational Mobility in Australia, Italy and the U.S. (67-70)

Intergenerational mobility describes the diffusion of a cohort of individuals through social class in relation to the starting point provided by the cohort of fathers (defining the platform, the origin or the social background).

Table 42 gives a measure of the mobility from the father's occupational stratum to the stratum currently occupied by their sons. The first observation arising is that there is little mobility for sons of fathers in the manual and non-manual categories. In all three countries six or seven out of ten sons had not left the stratum occupied by their fathers. Secondly, in all three countries between a quarter and a third (26% to 35%) of sons with non-manual fathers were downwardly mobile into manual occupations, with much smaller numbers (1% to 6%) downwardly mobile into farming occupations.

On examination of the mobility patterns of sons with blue-collar fathers* we note that there is a somewhat greater variation between the countries. In Italy only one in five (20%) of sons with blue-collar fathers were upwardly mobile into the non-manual strata, whereas more than one in three of Americans moved in this way. For Australia the number is 31%; between the two but closer to the American figure. According to this measure we might conclude that the U.S. has the more, and Italy, the less "open" stratification systems.

Examination of the data for mobility from the farming stratum also indicates a marked difference between the countries. In the U.S. only 22% of sons were immobile in their father's farming occupations (compared to over 60% in the manual and non-manual categories) whereas the comparable figures are 41% in Australia and 53% in Italy. Although the U.S. and Australia had comparable rates of mobility from farming to the non-manual stratum (19% in Australia, 22% in the U.S.), the U.S. had a much greater degree of mobility

* That is, fathers who were employed in manual categories.

TABLE 42⁽⁶⁷⁾

FATHER-TO-SON MOBILITY IN AUSTRALIA, ITALY, AND THE UNITED STATES

Occupational Division	Father's Occupation (Columns)	Son's Occupation* (Row Percentages)			
	Percentage	Non- Manual	Manual	Farm	Total
Australia					
Non-manual	26	60	35	6	101
Manual	51	31	65	4	100
Farm	23	19	40	41	100
Total	100	35	52	13	100
Italy					
Non-manual	16	70	26	4	100
Manual	39	20	76	5	101
Farm	45	8	39	53	100
Total	100	22	51	26	99
United States					
Non-manual	22	69	29	1	99
Manual	47	36	62	2	100
Farm	31	22	56	22	100
Total	100	39	53	8	100

*Cells are to be read as follows: Of Australian workers whose fathers were non-manual workers, 60 percent were themselves non-manual workers, 35 percent were manual workers, and 6 percent were farm workers.

TABLE 43⁽⁶⁷⁾

SUMMARY STATISTICS OF MOBILITY FOR AUSTRALIA, ITALY, AND THE UNITED STATES

Mobility		Australia %	Italy %	U. S. A. %
1.	Total observed mobility	41.6	35.4	48.8
2.	Structural mobility	10.1	18.8	23.1
3.	Circulation mobility	31.5	16.6	25.7

into the manual stratum- 56% as compared to 40% in Australia. Although the Italian rate of farm to manual mobility is comparable to Australia's, it is markedly less in terms of farm to non-manual mobility, merely 8% of Italian sons with farming fathers having moved into non-manual occupations.

In summary, all three countries have comparable degrees of immobility in the manual and non-manual strata, although Italy and Australia show less upward mobility from the manual to the non-manual stratum than in the U. S. The greatest difference between the countries is in the degree and distribution of mobility from farming to non-farming occupations, the U.S. having the greatest movement overall and the greatest movement into the manual stratum in particular.

These gross differences can be partially illuminated by breaking the mobility down into different components, as in Table 43. The first line of the table, "observed mobility", is merely the percentage of respondents who occupied a stratum different from their fathers'. This ignores direction or distance moved so is simply the total sample minus all immobile respondents as a percentage of all respondents. On this criterion the United States clearly emerges with the highest mobility (48.8%), with Australia somewhat less (41.6%) and Italy having the least mobility of all (35.4%). The significance of these figures is revealed by the calculation that if in the test period the U.S. had Italy's rate of mobility, an extra 4.5 million American workers would have been immobile.

This data loses much of its sociological significance when the decline in the agricultural work force of the three countries is taken into account. Between 1910 and 1960, the percentage of farm workers in the U.S. labour force dropped from 35% to 8%, from 37% to 15% in Australia and from 54% to 28% in Italy. The pressure towards occupational mobility from farming occupations is similar in Italy and the U.S. (26% to 27%) and slightly less strong in Australia (22%). In relative terms, however, the American shift

is more significant, for the 27% decline is from a much smaller base than in Italy.

The second line in Table 43 gives the "structural mobility" which is largely determined by mobility from the farming stratum. Structural mobility is the degree of mobility required to transform the occupational distribution of fathers into the occupational distribution of sons. That is to say, because of changes in the occupational structure it is not possible for all sons of fathers in the farm stratum to remain there, this stratum having declined sufficiently to force some of the sons to be mobile. An estimate of the amount of structural mobility in the three countries can be obtained by subtracting the percentage of fathers in farm occupations (Australia, 23%; Italy, 45%; U.S., 31%) from the number of sons in the farming occupations (Australia, 13%; Italy, 26%; U.S., 8%) to arrive at the values 10%, 19% and 23% for structural mobility entered in the table.

Subtracting "structural" from "observed" mobility, we obtain the "circulation" mobility (line 3 in the table), which is an estimate of the degree of mobility in the absence of shifts in the occupational structure. This, rather than the gross figure, would appear to be the most significant measure of the relative "openness" of the stratification systems of the three countries. We can see that although the U.S. has the greatest degree of "observed" mobility, Australia has the higher degree of "circulation" mobility which on the basis of current popular values implies that Australia is the most equitable of the three countries.

Although we have some reservations about the method of calculation of "circulation mobility," we agree with the philosophy of definition, which leads very close to our definition of social diffusion in the absence of unstable forces - the so-called intrinsic diffusion. It is a fundamental measure of society's ability to quickly restabilize subsequent to changes in the internal power relations or in the external forces. It is probably not a coincidence that

the relative incidence of violent social relations within these three countries is in inverse relation to their "circulation mobility" ratings.

There appears to exist no comprehensive data of this kind for Canadian cohorts. However, a limited study of intergenerational occupational mobility in the province of Quebec has been presented by de Jocos and Rocher⁽⁷¹⁾. Table 44 has been abridged from that paper.

TABLE 44

Occupational Distribution of French and English-speaking Fathers and Sons in
Urban Districts of the Province of Quebec

Occupational Class	Fathers		Sons	
	French- speaking	English- speaking	French- speaking	English- speaking
White collar workers	21	37	32	63
Blue collar workers	61	45	66	36
Farmers	18	18	2	1

As in the U.S., the main force for mobility has been the decline of farming in the economy; indeed, the general pattern is similar to that in our neighbour to the south. In the group as a whole the migration from the farming class to the blue collar class was matched by the migration of blue collar workers to the white-collar class, keeping the blue collar group at a fixed percentage as between the father-son cohorts. There also is some evidence from Table 44 that the English-speaking cohort of sons (which was only 10% of the sample) had a much higher mobility towards the white-collar class. The inequalities recognized here are undoubtedly related to those identified for Ottawa University students in Fig. 7 and for French Canadians in Table 29 .

Effects of Education and Race on Mobility

The preceding material for the U. S. (excluding men with farming backgrounds in most cases) has served as a basis for sorting out the relative influences of several variables on the relationship between father's and son's occupation. Two of the most important of these are education and (especially in the United States) ethnic (racial) origin.⁽⁶⁸⁾ The procedure used was to first rank respondent's and father's occupation on a scale employing income and education as criteria (giving the SES — socio-economic score) and then to employ regression analysis to determine the effects of different variables on that status. This analysis showed that the influence of father's socio-economic status is largely mediated by education. A man's chances of occupational advancement depend on his education (correlation coefficient of +0.61) which in turn depends to a considerable degree on the socio-economic status of his father (+0.41). Table 45 demonstrates these educational effects in another form, as well as the effects of ethnicity. The shocking effects of colour discrimination in the U. S. are evident from the last entries. Even when education is held constant, Negroes' occupational attainment is considerably inferior to whites. Negroes are not only handicapped by having less education and lower social origins than whites, but when these factors are statistically controlled their occupational status invariably remains lower than whites. The extent of this discrimination is pointed up when we contrast the situation of Negroes to that of first and second generation Americans, who do not appear to differ in occupational status from native whites with the same level of education.

In summary, in Australia, the U. S. and Quebec there is evidence of considerable social mobility, much of it upward as generally perceived within those societies. Despite this, the migrations tend not to break through the major manual/non-manual division, although a significant number of

TABLE 45⁽⁶⁸⁾

ETHNIC BACKGROUND, EDUCATION, AND OCCUPATIONAL SOCIO-ECONOMIC
SCORES OF AMERICAN MEN WITH NONFARM BACKGROUND, AGE 20 TO 64

Ethnicity by Education	<u>Age</u>				
	20-24	25-34	35-44	45-54	55-
Grand Mean SES, All Groups	31.5	41.0	42.6	40.1	40

GROSS EFFECTS

AS DEVIATION FROM GRAND MEAN

Native white, native parentage					
8 years of schooling or less	-12.9	-18.1	-18.7	-13.8	-10.6
9 to 11 years of schooling	-8.7	-13.6	-11.1	-5.6	0.3
High School graduate	0.2	-3.1	1.7	3.0	8.0
1 year of college or more	8.3	20.1	22.2	19.3	20.9
Native white, foreign parentage					
8 years of schooling or less	-12.9	-18.0	-18.1	-14.6	-9.0
9 to 11 years of schooling	2.5	-11.6	-14.3	-6.6	-0.9
High school graduate	4.7	-3.0	-0.8	6.4	6.7
1 year of college or more	12.3	21.2	20.3	24.1	21.2
Foreign-born white					
8 years of schooling or less	-12.9	-15.5	-19.4	-13.8	-10.8
9 to 11 years of schooling	0.3	-9.6	-12.8	-3.0	1.5
High school graduate	1.1	-13.2	3.8	-2.9	4.9
1 year of college or more	5.4	19.3	12.9	17.0	19.6
Nonwhite					
8 years of schooling or less	-20.3	-25.3	-23.8	-21.0	-19.5
9 to 11 years of schooling	-13.5	-23.4	-20.9	-17.7	-20.6
High school graduate	-7.5	-19.0	-18.3	-18.3	-2.8
1 year of college or more	-1.4	9.7	5.4	-3.9	8.1

individuals manage to do so. Examining the effect of several variables on occupational chances it is found that although father's occupational status has a significant direct bearing on the son's occupational status, the influence is even more significant as mediated through education. For blacks in the U.S., race is the most significant variable of all.

Social Mobility and Income Profiles

The concept of social mobility is further clarified by examining its relationship to the economic structure of society. According to our definition of mobility as a flow between classes to rebalance social forces originating from external influences or spontaneous internal changes in class structure we should anticipate no marked change in structure due to mobility alone. In other words, mobility is mainly an effect rather than a cause. At best, social mobility can lead to a redistribution of numbers of individuals between certain pre-assigned classes. This does not mean, however, that such redistributions will occur within all the significant classification systems.

It seems reasonable to suppose that intergenerational mobility rates as defined above, are similar in Canada to those in the U.S. We might therefore infer that during any ten year period a significant migration towards the higher socio-economic classes would occur. This is by no means the case, as Table 46 on Canadian income distributions between 1951 and 1961 shows.⁽⁵⁴⁾ To all intents and purposes the profiles have remained constant. It must therefore be that unidentified structural changes (e.g., changes in the age distribution of society towards lower values) have acted to counteract the positive effect of intergenerational mobility deriving (we surmise) from the structural changes associated with urbanization, expansion and advancing technology.

TABLE 46⁽⁵⁴⁾

Percentage Distribution of Income Components and Total Income by Quintiles of Families and Unattached Individuals, Selected Years 1951-1961

Income	Quintiles				
	First	Second	Third	Fourth	Fifth
1951 Totals, Income Expressed as a % of fifth quintile	6.1	12.9	17.4	22.4	42.1
	14.8	31.3	42.3	54.5	100.0
1954 Totals, Income Expressed as a % of fifth quintile	6.5	13.5	18.1	24.4	37.5
	17.3	36.0	48.2	65.0	100.0
1957 Totals, Income Expressed as a % of fifth quintile	6.3	13.1	18.1	23.4	39.1
	16.1	33.5	46.2	59.8	100.0
1959 Totals, Income Expressed as a % of fifth quintile	6.8	13.4	17.8	23.0	39.0
	17.4	34.3	45.6	58.9	100.0
1961 Totals, Income Expressed as a % of fifth quintile	6.6	13.5	18.3	23.4	38.4
	19.7	35.1	47.2	60.9	100.0

6.4 Overview

As in the biological world, social adaptability is an essential element of viability and survival. It is in both biology and society a property which is extremely difficult to characterize quantitatively. We have proposed in the foregoing that measures of openness, participation and responsiveness can be used as indicators of the mutative characteristics, and social mobility or social diffusion as indicators of the moderative characteristics implied by the term adaptability. In general, a mutative change which is externally imposed (e.g., conquest of, or by, a foreign nation) or internally generated (e.g., a new party or a resource discovery) is followed by a readjustment and redistribution of persons among classes through the process of social diffusion toward a new stability point. There is some evidence that income distributions in large social systems are very stable against minor and moderate changes in class structure. We would surmise that this is a consequence of the self-stabilizing market mechanism which operates in successful capitalist societies.

7. RESEARCH AND DEVELOPMENT, ENTREPRENEURSHIP AND INNOVATION

7.1 Introduction

Material progress as a universal public good has had its image somewhat sullied in recent years through public recognition of its negative side in pollution, urban blight and traffic congestion. It remains, however, that the material needs of many of our citizens have not yet been met so strong pressures for further advances in production and distribution remain. The perceived need for continued material progress and the necessary compounding of the negative externalities make it imperative that governments devote increasing efforts towards monitoring the process.

Economic indicators are of course important measures of material progress. Table 47 following clearly indicates the growth characteristics of the Canadian economy in the past decade. Productivity in the commercial sector has increased by 40% and real purchasing power for wage-earners in the industrial sector has increased by about 25%. While Canada remains a major importer of foreign capital, our current positive balance of international payments is well in excess of capital inflow. Such positive indications may give us cause for optimism. Notwithstanding, these indications fall far short of providing a measure of either the long-range potential of the economy or the fine structure as pertaining to the unemployed, the disadvantaged and those on fixed income. For example, they give no indication of the extent to which current prosperity is due to continued raiding of our natural resources in relation to value added through productive and creative labour.

In the social accounts, progress must be measured increasingly in terms of utilization of our intellectual resources in comparison to the necessarily dwindling natural resources. This chapter has therefore to do with the evaluation of Canada's intellectual resources, and the extent to which

Structure and Performance of the Economy

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Gross National Product										
	(Millions of dollars)									
At Market Prices.....	39,080	42,353	45,465	49,783	54,897	61,421	65,722	71,388	78,560	84,468
% CHANGE FROM PREVIOUS YEAR.....	3.5	8.4	7.3	9.5	10.3	11.9	7.0	8.6	10.0	7.5
Constant (1961) Dollars.....	39,080	41,778	43,996	47,050	50,149	53,650	55,517	58,259	61,214	63,210
% CHANGE FROM PREVIOUS YEAR.....	2.9	6.9	5.3	6.9	6.6	7.0	3.5	4.9	5.1	3.3
Per Capita Gross National Product										
	(Dollars)									
At Market Prices.....	2,143	2,279	2,402	2,581	2,795	3,069	3,221	3,441	3,730	3,951
% CHANGE FROM PREVIOUS YEAR.....	1.4	6.3	5.4	7.5	8.3	9.8	5.0	6.8	8.4	5.9
Constant (1961) Dollars.....	2,143	2,248	2,324	2,439	2,553	2,680	2,721	2,808	2,907	2,957
% CHANGE FROM PREVIOUS YEAR.....	0.8	4.9	3.4	4.9	4.7	5.0	1.5	3.2	3.5	1.7
Production Indexes										
	(1961 = 100)									
Index of Industrial Production...	100	108	115	127	137	146	151	160	167	170
% CHANGE FROM PREVIOUS YEAR ¹ ...	4.0	8.3	6.4	9.9	8.2	6.6	3.3	5.9	4.3	2.3
Manufacturing.....	100	109	116	127	139	149	152	161	168	167
Mining.....	100	106	112	126	132	134	142	150	150	173
Electricity, Gas and Water Utilities...	100	105	112	121	130	141	151	163	178	192
Other Production Indexes										
Agriculture.....	100	122	137	124	128	146	119	125	131	124
Construction.....	100	106	107	117	132	142	141	151	154	150
Transportation.....	100	104	111	122	130	142	148	156	164	173
Trade.....	100	106	111	120	129	138	145	151	158	160
Productivity Indexes										
	(1961 = 100)									
Output Per Manhour	100	127	146	139	153	188	151	166	177	177
Agriculture.....	100	105	109	114	118	122	125	133	138	140
Non-manufacturing.....	100	102	105	109	111	114	116	122	123	127
Total Commercial Industries ²	100	105	110	114	119	125	126	134	137	141
Population										
	(Thousands)									
Total Population (June 1).....	18,238	18,583	18,931	19,290	19,644	20,015	20,405	20,744	21,061	21,377
% CHANGE FROM PREVIOUS YEAR.....	2.1	1.9	1.9	1.9	1.8	1.9	1.9	1.7	1.5	1.5
Civilian Labour Force³										
	(Thousands)									
Total Force (Annual average).....	6,521	6,615	6,748	6,933	7,141	7,420	7,694	7,919	8,162	8,374
% CHANGE FROM PREVIOUS YEAR.....	1.7	1.4	2.0	2.7	3.0	3.9	3.7	2.9	3.1	2.6
Employment (Annual average).....	6,055	6,225	6,375	6,609	6,862	7,152	7,379	7,537	7,780	7,879
Unemployment (Annual average).....	466	390	374	324	280	267	315	382	382	495
Unemployment Rate (Annual average).....	(Per cent)									
	7.1	5.9	5.5	4.7	3.9	3.6	4.1	4.8	4.7	5.9
Average Weekly Wages and Salaries										
	(Dollars)									
Industrial Composite ⁴	78.24	80.54	83.27	86.51	91.01	96.34	102.83	109.88	117.64	126.82
% CHANGE FROM PREVIOUS YEAR.....	3.3	2.9	3.4	3.9	5.2	5.9	6.7	6.9	7.1	7.8
Housing										
	(Thousands of units)									
Dwelling Starts.....	125.6	130.1	148.6	165.7	166.6	134.5	164.1	196.9	210.4	190.5
% CHANGE FROM PREVIOUS YEAR.....	15.3	3.6	14.2	11.5	0.5	-19.3	22.0	20.0	6.9	-9.5
Prices										
	(1961 = 100)									
Consumer Price Index.....	100.0	101.2	103.0	104.8	107.4	111.4	115.4	120.1	125.5	129.7
% CHANGE FROM PREVIOUS YEAR.....	0.9	1.2	1.8	1.7	2.5	3.7	3.6	4.1	4.5	3.3
Wholesale Price Index ⁵	100.0	102.9	104.8	105.2	107.3	111.2	113.2	115.7	121.0	122.8
% CHANGE FROM PREVIOUS YEAR.....	1.0	2.9	1.8	0.4	2.0	3.6	1.8	2.2	4.6	1.5
GNP Price Index.....	100.0	101.4	103.3	105.8	109.5	114.5	118.4	122.5	128.3	133.6
% CHANGE FROM PREVIOUS YEAR.....	0.6	1.4	1.9	2.4	3.5	4.6	3.4	3.5	4.7	4.1
Purchasing Power of the Canadian Dollar										
	(1961 = 100 Cents)									
On the basis of changes in the Consumer Price Index.....	100.0	98.8	97.1	95.4	93.1	89.8	86.7	83.3	79.7	77.1

they are being utilized in furthering the progress of the general economy and the public weal. The rather comprehensive indicators available present a dismal if not surprising picture of the under-utilization of intellectual resources in this branch-plant economy.

7.2 Historical Trends in Research and Development

Research and development (R and D) activities embrace a plethora of notions and functions which claim relevance to social progress and economic growth. Within this area there exist three identifiable levels of activity, all of which contribute to the direction and progress of the enterprise as a whole. There is fundamental research which is concerned with the acquisition new knowledge, there is applied research pertaining to specific problems or problem areas and there is development leading to innovation, where technical or scientific ideas are realized in new products or processes.

Research and development in Canada and its historical development has been examined recently by the special Senate Committee on Science Policy and by the O. E. C. D.^(73, 74) After World War I, the new National Research Council (N.R.C.) undertook an appraisal of scientific and industrial research in Canada through a questionnaire which was sent out to some 8,000 firms. Of the 2,800 respondents, only 37 firms were found to have research laboratories. The majority of these employed one research person, four employed two or three, and seven or eight employed four or more. The National Research Council concluded that there were not more than 50 research personnel in industry in the entire country.

The official function of the N.R.C. was to co-ordinate and assist industrial research. The Council saw a loose relationship between science,

technology, and practical development wherein fundamental research would be confined to the universities and where, as an adjunct, the necessary scientific personnel for industry would be trained. Applied research would be carried out in government laboratories and in those few firms who employed trained scientific personnel, development and innovation being left in the hands of industry.

This pattern framed research and development activity in Canada between 1919 and the early 1960s. Universities remained remote from industrial needs and concentrated on basic science. Canadian industry was unable, for a variety of reasons, to carry on research and development of good quality. Government laboratories were therefore maintained and expanded to provide employment opportunities for the Canadian scientists graduating from universities and to concentrate on long-term investigations. It was optimistically supposed that industry would ultimately develop the ability to utilize the long-range science output. The belief persisted that free and fundamental research is the initial and indispensable step towards the production of new technology and innovation.

Attendant upon World War II was an impressive expansion of applied research and innovation. However, in direct contrast with U.S. practice, which gave over wartime research and development to private contractors, the Canadian effort was carried out within existing or newly created government agencies and the impetus in science and technology was accordingly kept relatively isolated from private industry.

For better or for worse, in basic science we have achieved a strong level of maturity of growth, reputation and public support. On the other hand, we can lay claim to only marginal achievements in applied science and a near total lack of an industrial infrastructure to receive and utilize its outputs. Such are the characteristics of Canadian efforts as reflected in the analysis of research and development expenditures in the following pages.

7.3 Expenditures on Research and Development

Canada spends a relatively smaller proportion of its G.N.P. on Research and Development in comparison to other countries within the O.E.C.D. grouping as Table 48 indicates:

TABLE 48⁽⁷⁵⁾

Percentage of GNP Devoted to GERD, R & D Expenditures (\$US) and R & D Manpower (Qualified Scientists and Engineers, QSE) for Ten Selected OECD Countries

Country	GERD/GNP ¹		R & D Expenditures ¹ (millions of US\$) 1967		R & D Manpower ¹ QSEs in R & D 1967	
	1963	1967	Amount	% Share	Number	% Share
U.S.A. (1964, 1966).....	3.0	2.9	22,285	67.0	537,278	58.6
U.K. (1964).....	2.3	2.3	2,533	7.6	50,350	5.5
France.....	1.6	2.3	2,507	7.5	49,224	5.4
Netherlands (1964).....	1.9	2.3	514	1.5	15,700	1.7
Switzerland.....	—	1.9	304	0.9	10,954	1.2
Germany (1964).....	1.4	1.7	2,084	6.3	61,559	6.7
Japan.....	1.5	1.82	1,684	5.1	157,612	17.2
Sweden (1964).....	1.3	1.4	336	1.0	7,395	0.8
Canada.....	1.1	1.43	828	2.5	19,350	2.1
Belgium.....	1.0	0.9	176	0.5	7,945	0.9
Total.....			33,251	100.0	917,357	100.0

The character of the Canadian effort can be better comprehended by breaking down the expenditures to the three levels of activity identified earlier, as shown in Table 49.

TABLE 49⁽⁷⁶⁾

Distribution of Total National R & D Expenditures by Type of Activity and Country, 1967

Percentages¹

Country	Development	Applied Research	Fundamental Research
Switzerland ²	3	3	14.5
U.K.....	64.6	24.4	11.0
U.S.A.....	64.3	21.6	14.1
Netherlands.....	48.7	3	3
France.....	47.8	3	3
Japan.....	42.5	30.8	26.7
Canada.....	38.9	38.0	23.1
Belgium.....	37.2	42.2	20.5

In comparison to the United States, Canada spends about twice as much proportionately on fundamental research* and about half as much on development. Furthermore, continuing the thrust of past history, our emphasis on support of research and development in government and universities in relation to our support in industry is in inverse proportion to that in the United States (Table 50).

TABLE 50⁽⁷⁷⁾

Distribution of National R & D Expenditures by Sectors of Performance and Country, 1967

(Percentages)

	Business Enterprise	Government	Higher Education	Private Non-Profit
Switzerland.....	76.5	6.3	17.1	—
Sweden.....	69.9	14.2	15.5	0.4
U.S.A.....	69.8	14.5	12.2	3.6
Germany.....	68.2	5.1	16.3	10.4
Belgium.....	66.8	10.4	21.4	1.3
U.K.....	64.9	24.8	7.8	2.5
Japan.....	62.5	13.0	22.9	1.6
Netherlands.....	58.1	2.7	17.7	21.5
France.....	54.2	32.1	12.9	0.8
Canada.....	37.7	35.6	26.7	

* But not on research in the social sciences. This is why in this report we have had to use a large amount of American data in lieu of appropriate Canadian material.

Where basic science has succeeded in Canada, technology and innovation fall far short of O. E. C. D. norms. This country is within the top three as regards the relative number of qualified scientists and engineers engaged in research and development¹; we are at the bottom of the list when it comes to technological and innovative performance as Tables 51 and 52 demonstrate.

TABLE 51⁽⁷⁸⁾

*Qualified Scientists and Engineers (QSEs) in R & D in
Seven OECD Countries, 1967*

Country	Total No. of QSEs in R & D ¹	Total Civilian Labour Force Employed ² (000's)	QSEs in R & D as percent of Labour Force	Rank
U.S.A.....	537,273	74,372	0.72	1
France.....	49,224	10,620 ³	0.46	2
Canada.....	19,350	7,379	0.26	3
Germany.....	61,559	25,803	0.24	4
Belgium.....	7,945	3,616	0.22	5
U.K.....	50,345	24,509	0.21	6
Sweden.....	7,395	3,734	0.20	7

TABLE 52⁽⁷⁹⁾

*EXPORTS BY 10 MEMBER COUNTRIES OF OECD OF PRODUCTS
OF HIGH INTENSITY RESEARCH INDUSTRIES, 1963-1965*

Country	Share of the country in total exports of manufactured products	Share of each country in world trade in high intensity research industries		Share of each country in the exports of 50 high intensity research products			Share of high in research indust in the exports by ca of manufactured p	
		Not including aircraft and non-electrical equipment ¹	Including aircraft and non-electrical equipment ¹	Products of high intensity research products		Product of other industries	Not including aircraft and non-electrical equipment ¹	I air non eq
				D	E			
	A	B	C			F	G	
United States	22.6	26.6	30.1	31.1	30.6	28.6	28.9	
Germany	18.1	21.8	22.1	21.1	22.2	20.4	23.6	
United Kingdom	13.2	12.9	14.2	13.9	13.8	13.3	19.1	
France	9.8	8.9	7.7	6.5	6.5	7.4	17.7	
Japan	8.1	7.5	5.3	5.9	6.7	7.2	18.0	
Italy	7.5	5.7	5.9	5.7	5.4	5.8	14.7	
Netherlands	5.9	7.6	5.3	5.9	6.3	6.3	25.0	
Belgium	5.8	3.5	3.2	3.0	1.8	4.0	11.7	
Canada	5.5	3.3	3.4	2.9	2.8	3.0	11.6	
Sweden	3.5	2.2	2.8	4.0	3.9	4.0	12.1	
	100.0	100.0	100.0	100.0	100.0	100.0	19.0	

1. Sectors considered are: pharmaceutical products, chemical products, electrical equipment and scientific instruments.

2. Same sectors as in 1. plus aircraft and non-electrical equipment.

Clearly, any analysis of research and development in Canada must cope with the contradiction between a first class science effort and a last place technological performance. The missing link in the puzzle may be the structure and character of Canadian industry and the complicating factor of foreign ownership.

7.4 Effects of Foreign Ownership

Of all the industrial nations, Canada has the highest proportion of its business and industry owned by non-nationals. Goodman reports that the percentage of assets owned by non-residents in Canadian corporations is as follows: ⁽⁸⁰⁾

Rubber Products	92.4%
Prototextile Industries	36.9%
Pulp and Paper Mills	38 %
Protopaper and Allied Industries	38.8%
Agricultural Implements	37.8%
Total Machinery	71.9%
Motor Vehicle and Parts	95.7%
Total Transportation Equipment	86.2%
Iron and Steel Mills	22 %
Total Electrical Products	65.7%
Total Chemical and Chemical Products	83 %
Petroleum Refineries	100 %
Other Petroleum and Coal Products	78.4%
Total Petroleum and Coal Products	96.6%
Oil and Gas Well Industries	82.6%
Smelting and Refining	84.9%
Total Mining	60.0%

This pattern is further complicated by the distribution of membership of Canadians in labour organizations (1967):⁽⁸⁰⁾

International unions	64.3%
National unions	25.9%
Government Employees Associations	9.7%

The relationship between research and development effort and foreign control of the Canadian economy is not a simple one. O. E. C. D. reports (Table 53) that the highest intensity of research is found in the following industries: transportation equipment, electrical products, petroleum and chemicals, and that in each of these cases, the research and development level in Canada is one third to one fifth that in the United States. It is in

TABLE 53⁽⁸¹⁾

CURRENT INTRAMURAL RESEARCH
AND DEVELOPMENT IN PERCENTAGE OF ADDED VALUE
COMPARISON BETWEEN CANADA AND THE UNITED STATES, 1965

	United States ¹	Canada	Ratio Canada/ United States
<i>Manufacturing industry, Total</i>	6.16	1.42	0.23
<i>Capital goods:</i>			
Transportation equipment	21.29	3.49	0.16
Electrical products	15.66	5.21	0.33
Machinery	4.94	1.07	0.22
<i>Intermediate and basic commodities:</i>			
Petroleum	10.47	4.08	0.38
Chemicals	6.98	2.70	0.38
Rubber	2.93	0.99	0.33
Non-metallic mineral products	1.50	0.31	0.21
Primary metals	1.15	1.18	1.03
Metal products	1.02	0.27	0.26
Paper	0.90	1.05	1.15
<i>Consumer goods:</i>			
Food	0.64	0.24	0.37
Wood and furniture	0.16	0.04	0.25
Other manufacturing	1.72	0.56	0.32

1. Including provision for amortisation.

these particular industries that foreign ownership (particularly American) is concentrated (see Table 54). The situation may even be worse than indicated by such tabular data since O. E. C. D. suggests that many of the members of the "research" staff of branch plant operations are only window dressing and adjuncts of the sales staff. Their function is primarily for technical assistance to customers rather than for development.

A telling and forbidding observation is that research and development effort by foreign-owned firms, already comparatively low, is decreasing, as indicated in Table 54. In precisely those areas where industry should bring research and development efforts to fruition, Canada's performance is exceptionally poor. The implication is that our R and D effort not only lacks direction but harbours technological dependence which is linked to the

TABLE 54⁽⁸²⁾

—Research Intensity in Canada by 326 Foreign-Owned
Subsidiaries: R & D Expenditures as a Percentage of Sales

	1964	1967	1968 ¹
	(millions of dollars)		
Total Sales.....	15,342	20,742	22,484
Current Expenditures on Research and Development (excl. salaries and wages)			
—Total.....	98	120	109
—Abroad.....	—10	—14	—15
—in Canada.....	88	106	94
R & D salaries and wages in Canada ²	90	128	111
Total R & D in Canada			
Current Expenditures.....	178	234	205
Research Intensity in Canada			
—excl. salaries.....	0.58%	0.51%	0.42%
—incl. salaries.....	1.16%	1.13%	0.91%

predominant foreign ownership and control in major parts of the economy. In contradistinction to this general trend, where Canadian industry is owned and controlled by Canadians as in agriculture and in individual industries such as steel, our record and performance is excellent.

The evident failure of government funded R and D to have an economic impact seems to extend to the social arena as well. In the latter case we are forced to associate the shortfall with misapprehended priorities of government policy-makers.

For example, the science component of government research and development expenditures continues to be strongly weighted toward the physical sciences though the economic returns are now known to be marginal. While the N. R. C. can support the research of nearly two-thirds of physical scientists in Canada, Canada Council can support work by only 10% of its career scholars in the life and social sciences area. Engineering and design disciplines complain of being similarly starved. With the same apparent sense of priorities, the Central Mortgage and Housing Corporation, which is the agency of the Canadian government most concerned with housing and urban planning, spent only \$2.7 million on research and development within the last fourteen years.⁽⁸³⁾

Improved economic and social reporting, with an appraisal of cost and benefits of government funding of research in all sectors cannot help but lead to a more rational and efficacious assignment of priorities.

7.5 Entrepreneurship and Innovation

The popular image of an advanced industrial society is connected with a conception of innovators and creators of new products and processes. Canadians have not often been associated with such an image, either by themselves or by others. Explanations for this often stem from the view that Canadians are less materialistic, less ambitious, or perhaps downright dull.

Such views will neither be defended nor accorded the status of relevance. Rather, innovation will be considered in the context that it is a social process linked with research and development on the one hand and with forms of economic organization on the other.

It has been stated by one historian that by and large, innovation in Canada is not a happy story.⁽⁸⁴⁾ This is not so because Canada has lacked the inventive talent; on the contrary it is because of lack of interest and lack of financial and industrial capacity. While the number of significant inventions attributable to Canadians is substantial, the record of innovation in industry and in the development of new products is exceptionally poor. Indeed Canada is at the bottom of the list of technological innovators amongst the O. E. C. D. countries, as Table 55 shows.

TABLE 55⁽⁸⁵⁾

Four Performance Indicators of Technological Innovation in Ten Industrially Advanced Countries

Indicators		I. Location of 100 Significant Innovations since 1945			II. Monetary Receipts for Patents etc., 1963-64			Percent Share of Ten Countries' Mfd. Exports	III. Number of Patents Taken Out in Foreign Countries, 1963			IV. Export Performance in Research-Intensive Product Groups 1963-65			Composite Rank
		Absolute No.	With USA Base 100	Rank	Absolute \$ million	With USA Base 100	Rank		Absolute No. [000's]	With USA Base 100	Rank	% share of 10 countries	With USA Base 100	Rank	
Belgium.....	1,645	1	20.6	5	7.9	34.2	5	5.8	1.8	12.4	10	3.0	37.6	10	8
Canada.....	2,428	0	0	10	6.2	18.3	8	5.5	1.9	13.9	9	2.0	38.3	9	10
France.....	7,940	2	8.5	8	46.3	41.9	4	9.8	9.3	38.1	6	6.5	48.2	8	6
Germany.....	12,385	14	38.3	4	49.4	28.7	7	18.1	29.9	64.7	2	21.1	84.7	2	3
Italy.....	7,776	3	13.2	7	9.9	9.1	9	7.5	4.6	24.6	7	5.7	55.2	6	7
Japan.....	17,129	4	7.9	9	5.9	2.4	10	8.1	3.5	17.4	8	5.9	52.9	7	9
Netherlands.....	1,847	1	18.3	6	26.0	101.2	1	5.9	6.4	43.6	5	5.9	72.7	5	5
Sweden.....	1,535	4	88.4	2	7.1	33.3	6	3.5	3.8	43.7	4	4.0	83.1	3	3
U.K.....	11,798	18	51.8	3	76.1	46.4	3	13.2	15.2	45.2	3	13.9	76.5	4	2
U.S.A.....	25,063	74	100.0	1	386.7	100.0	2	22.6	56.3	100.0	1	31.1	100.0	1	1

This poor performance seems to stem from a failure to attain an adequate level of industrial research and development as a back-up to a vigorous program of innovation. This failure may in turn be attributed to the unique structure of the research and development effort in Canada and to the effects of foreign ownership. The poor performance recorded in the table above is consistent with the patent statistics in Table 56. This data pointedly emphasizes our growing dependency on foreign nations for innovations.

TABLE 56⁽⁸⁶⁾

Canadian Patent Statistics, 1964-1970

Year	Number of Patents Issued	Residence of Inventor Granted Patent			
		Canada	U.K.	U.S.A.	Other
1964-65	23,451	1,116	1,936	15,951	4,448
1965-66	24,241	1,131	2,000	16,274	4,836
1966-67	24,432	1,222	1,769	16,614	4,827
1967-68	25,836	1,263	1,862	17,583	5,128
1968-69	27,703	1,433	2,013	18,542	5,715
1969-70	31,360	1,814	2,263	18,702	8,581
Average	26,170	1,330	1,974	17,278	5,589
% Distribution	100%	5%	7.5%	66%	21.5%

7.6 Conclusions

It is surprising, indeed dismaying, that Canada, with an enviable record in inventiveness and entrepreneurship at the frontier-in agriculture, mining, metal production, hydro-electric and lumbering - should fall so far short of technical leadership in the non-primary sectors of the industrial arena. Here is an economic and social problem which will weigh increasingly heavily upon us as our natural resources become depleted through the depredations of North American industry and overt consumption by the population. It is a problem of which the government is well aware as indicated

by the following quotation from the Gray Report:⁽⁸⁷⁾

The high and growing degree of foreign, and particularly U.S., control of Canadian business activity has led to a Canadian industrial structure which largely reflects the growth priorities of foreign corporations. Many of these corporations invested in Canada to extend the market for their manufactures. Subsequently, Canada has become locked into accepting a pattern of innovation and technological development originating abroad. Other corporations invested in Canada to extract resources for home consumption. In either case, to the extent that these corporations were influenced by their home environment, their investment decisions reflected the industrial priorities of foreign governments and economies. This in turn has contributed to the integration of the Canadian economy into the world economy in a way which could make it increasingly difficult for Canada to realize its growth and employment objectives.

It has as well led to the establishment of "truncated" firms for which many important activities are performed abroad by the parent company, with the result that the development of Canadian capacities or activities in these areas is stultified.

These developments have made it more difficult for the government to control the domestic national economic environment. They have also influenced the development of the social, cultural and political environment in Canada.

8. LEARNING, SCIENCE AND THE ARTS

8.1 Introduction

We earlier characterized learning (knowledge) as the central element in the generation and mediation of changes in all the other elements of the social slate. Having studied the text up to this point and reflected one's impressions against the tabulated slate on page 12, it is impossible not to be impressed by the pervasiveness of learning and intellectual activity in relation to the positive potential for progress and equity associated with each element. The fundamental reason for this centrality is that learning (the activity) is nothing more nor less than the process of classification. Without learning, as a process of accumulation and as a storehouse for knowledge, there would not exist that human-interest classification which comprises Table 1. This is not to say that other species do not have an aptitude for classification - such activity is necessary to survival (enemies, poisons, sexes, seasons, etc.,). Humans, however, are characterized by their ability to classify and sub-classify in a seemingly limitless progression of ever-increasing subtlety.

The primary and essential element for achievement in welfare economics is learning, (that is, the sharing of classifications among the citizenry), for the search for equity and progress is predicated upon the identification of different classes and the refinements which this activity affords. An important, but by no means exclusive contributor to learning is schooling and its associated bureaucracy. The professoriate, like the priesthood of bygone eras, holds custody of what it is useful and good to know. In its research role it also has control over new classifications, that is, new knowledge which is to be filtered into the public language. Society, bowing to all this expertise invariably assigns the task of delineating the learning priorities, or educational objectives, to the academics, little realizing that their parochial objectives ultimately and inadvertantly become the objectives of society as a whole. Hence

the meritocracy.

While educational policy-makers can usually agree on a list of general objectives, the agreement dissipates as soon as the list is disaggregated and the necessity of priority assignment becomes apparent. The OECD Secretariat, for example, lists as goal areas for post-secondary education: the economy, satisfying aggregate private demand for education, equality of educational opportunity, the quality of social life and values. On the basis of a liberal interpretation of terms, this list might appear to be consistent with a formulation of the Committee on Higher Education, Norway⁽⁸⁸⁾.

Post-secondary education shall offer opportunities for further personal development to everybody who is capable of benefiting from such education, it shall provide the skills necessary for the proper performance of highly qualified professional functions, and it shall train its students for constructive contributions to societal development.

It is evident that in a capitalist meritocracy (which is the OECD or American model) the economic and professional goals will receive the top priority, whereas in a less competitive egalitarian milieu (e.g., Norway) the main impetus will be towards improving the quality of social life and personal development.

Such differences need not be regarded as absolute if one is prepared to accept an evolutionary interpretation of educational goals. In a pre- and early industrial society, attainment of universal literacy is the central goal. In the fully developed and expanding industrial society, which tries to optimize the exploitation of its environment and all its resources, the competitive meritocracy would appear to be essential. The post-industrial society, which arises when the drives and possibilities for exploitation become saturated may turn to more moderate and therefore less competitive goals.*

* When the competitive drives are not sublimated as the opportunity for legitimate exploitation becomes saturated, territorial expansion seems inevitable.

We agree with Galbraith that North-American society is now in the throes of transition from an industrial to post-industrial ethos. We judge further that since Canada has never taken to the competitive spirit with the same fervour and conviction as have the Americans it should be easier for us to psychically adapt to new goal priorities and to proceed promptly towards adoption of the associated policy changes. These (we think) inevitable changes have been well-characterized in the following statement by Kjell Eide:⁽⁸⁹⁾

To Norwegian minds, the post-industrial society is not necessarily a society in which instrumental thinking developed within manufacturing industries has penetrated all other areas in society. There is a growing understanding that if our further societies are to be endurable, they must increasingly be dominated by values traditionally confined to the services, and that such values gradually will have to penetrate even industrial sectors of society. In educational terms, this means that our present emphasis on the output of educational institutions, gradually, will have to yield to an emphasis on the educational process itself, and the qualitative experiences involved for the true clients of this service function, the students themselves. Education should not become a manufacturing industry, producing students upon specifications given by society, by industry, by teachers or by parents.

We accept this statement, imposed as a priority caveat on the goal lists to be found in paragraph one, as a suitable and necessary base for developing a set of serviceable indicators of advance in Canadian society.

This means that the social report should not only ask demographic and economic questions such as: Is education numerically sustaining the scientific manpower market? and: Is the system satisfying the public demand for diplomas whereby earning power can be increased? It must increasingly ask questions such as: Have our students attained a genuine problem solving ability? Have their creative abilities been developed? Does the monopoly structure of the professions adequately sustain the public weal? Is the meritocracy giving way to true equity? Are our students increasingly aware of environmental problems? Have they gained such inner resources

as will sustain them in a complex modern world? Are the consumers of education reasonably distributed over age groups and economic classes? Should the concealed functions like screening and custody be measured and revealed to the public?

Since we have characterized educational and cultural activities as the mediator between the moderative and mutative elements within our general slate we may expect this dichotomy to be explicitly reflected within the sub-slate of this subject area. The following table of categories achieves such a breakdown:

TABLE 57

MODERATIVE ELEMENTS			MUTATIVE ELEMENTS		
A. Socialization	B. Aquisition and Trans- mission of knowledge and Skills	C. Public Service	D. Individu- alization	E. Creation of New Know- ledge and Relations	F. Public Criticism

Both the Western Interstate Commission for Higher Education (WICHE) and the Organization for Economic Co-operation and Development (OECD) have provided comprehensive lists of functions and possible measures which are broadly inclusive of the breakdown envisioned in Table 57.^(90, 6) Our main criticism of these slates has to do with their organization, their lack of priority weightings and their narrow conception of the public service function. Our own slate breakdown which follows carries with it the implication that each of the six subject-headings in Table 57 should receive comparable attention in social analysis and the resulting social report. Although the following outline contains explicit reference to activities which are endemic to post-secondary institutions, it is nonetheless meant to be inclusive of all educational activities.

8.2 Educational Slate Suggested by the Research Committee of COPSEO

Socialization: Induces responses, habits; instructs in right attitudes and values;

trains the elites, including leaders in business, arts and politics; provides for social mobility; transmits conventional wisdom; provides for democratization. Measures lie in the number of students and graduates at various educational levels who show respect for public property and concern for the environment; the percent who read newspapers, who vote compared to the general populace and who participate in the political and cultural life of the community; the percent who are free of prejudice and who speak foreign languages; the percent who exhibit high vocational and professional responsibility; the incidence of criminality.

Aquisition and Transmission of Knowledge and Skills: conventional function of elementary and secondary education; professional education; vocational education; a good part of "general" education; abets social mobility. Measures of output lie in traditional cost-benefit analyses (see Section 8.4). Further indicators lie in measures of student and graduate general knowledge, reading skills, mathematical skills, composition skills, articulation and speaking skills, second language skills, diplomas and degrees earned, certifications received and awards and recognitions.

Public Service: screening for the labour market; custody and baby-sitting; control of the labour flow; subsidy to the building industry; redistribution of income between age groups. Other specific aspects and activities which convey an indication of the service component are public use of institutional libraries, incidence of free lecture series, the campus as a park, as a cultural and an art center, community psychic income, attraction and stimulation of industry, continuing education activities, student and faculty involvement in community enterprises, consulting, medical services.

Individualization: providing a milieu for creativity, entrepreneurship, learning to think, logic skills, problem-solving; development of personal philosophy; development of self-realization and identity; adaptability. Indicators are to be found in the program transfer rate and the dropout rate; the legal violation

rate; the level of political, spiritual and sexual activity; the incidence of conflict between faculty and students; the comparative creativity and entrepreneurship of students and grads at various levels; the curriculum.

Creation of New Knowledge and Relationships: research activities; scholarly work; artistic and philosophic creation. Indicators can be identified in incidence of curriculum innovation; research topics and output; faculty and student involvement in research and scholarly work; emphasis on synthesis of knowledge; number of books, papers, reviews published; new inventions and developments; emphasis on creative arts; number of international prizes and patents awarded; comparisons with other constituencies.

Public Criticism: research applied to community problems; promotion of innovations in society; radical responses by students and faculty. Indicators are to be found in surveys of press response; numbers of environmental and conservation groups; participation in such groups; incidence of political activism by students and faculty.

An internal survey of university-associated persons at COPSEO concluded that the current decreasing order of functional emphasis within the institutions familiar to them is: socialization, knowledge and skills, public service, research and new knowledge, internalization and public criticism. That is to say, the emphasis is strongly moderative in character. Such a perception, if it could be verified by scientific analysis, would help to explain Canada's very poor showing in industrial innovation and entrepreneurship, as discussed in Chapter 7. Educational policy-makers, both within and without the institutions, have a pressing need for scientific appraisals of this kind.

8.3 Socialization

While many teachers from kindergarten to college would agree in private that steering the socialization process as defined above is perhaps their major function in the classroom, they are not inclined to broadcast the pervasiveness of this brain-washing activity. Socialization, of course, goes on outside the classroom as well. In the home and through the media, male and female children are directed very early into their lifetime roles, and schooling of all levels is used to reinforce these roles. There is good evidence that this process of male-female role reinforcement persists into the universities, and even the graduate schools. For example, an American report states that:⁽⁹¹⁾

... campus activists have begun to wonder if the removal of discrimination in the structure of higher education will end women's inferior position, or whether discrimination is not inherent in the curriculum itself: in American history courses that skim over the women's suffrage fight without any analysis of its political or social significance; in psychology courses that uncritically present Freudian views of women; in literature courses that blandly accept the female stereotypes of many modern novels. These academic women are asking how much is really known about women, about the structure of the family, and about the development of 'femininity' and 'masculinity'. Are there really innate differences between the sexes, and is there any conclusive research on the subject? How much of what we assume about men and women is fact, how much is fantasy?

Their questions and their doubts have risen from examining the content and the assumptions of college curricula. Humanities courses have traditionally assumed that man (meaning male) is the measure of all things. In history, one studies the position of women in different cultures and periods, but never the position of men, because the male role in society and the activities of prominent men are seen as history itself. The very language of most history texts bears this out.

Discussions of colonial America, for example, treat the early landowners and pioneers in exclusively male terms, ignoring the fact that single women also journeyed to the New World, took title to land, and set up farms, plantations, and businesses.

In philosophy, one studies the ideas of man's nature advanced by Aristotle, Rousseau, and Nietzsche, but one rarely notes that these men excluded 51 percent of the world from full humanity. Clearly, the fact that few philosophers have had an adequate notion of femininity has not been considered any flaw in their philosophical systems.

Attitudes toward women are even more clearly marked in philosophy's latter-day child, psychology. Critiques of the assumptions of Freudian psychology and its descendants by Simone de Beauvoir, Karen Horney, and Betty Friedan are decades old, but only now are their works being taken into serious consideration.

College students are well aware of the importance of this institutional function. In a recent survey of undergraduates at McMaster University the current functions of the university were ranked in the following order:⁽⁹²⁾

- | | | |
|----|---|-----|
| 1. | To qualify students for better jobs | 63% |
| 2. | To train students for the needs of society | 49% |
| 3. | To train students for the needs of business | 47% |
| 4. | To maintain the established values of our society | 36% |
| 5. | To facilitate upward mobility | 33% |
| 6. | To intellectually stimulate and excite | 32% |

When asked to rate functions as they should be they responded in the following order:

- | | | |
|----|--|-----|
| 1. | To intellectually stimulate and excite | 71% |
| 2. | To train students for the needs of society | 57% |
| 3. | To train our intellectual leaders | 37% |
| 4. | To qualify students for better jobs | 35% |
| 5. | To make good citizens | 33% |
| 6. | To maintain our cultural heritage | 28% |

Apparently, mature students not only perceive elements of socialization as a major component of their current experience, but approve of many elements in their perceptions of the ideal instructional milieu. They have clearly learned to appreciate stability and continuity as central societal values. For them the socialization process has accordingly been doubly successful. They have not only recognized that they are being socialized but that they approve of the treatment and its functions.

Recent criticisms and responses by student radicals have arisen in part from a strong aversion to these clearly evident brain-washing processes of the schooling system. Paradoxically, such students have been the focus of another historically validated socializing function of the schools- the taming of the maverick young - a function which for the most part is carried out very

effectively in Canada.

A direct and positive measure of how highly the teaching community values its socialization function is to be found in its vigorous penalization of its own members who step outside the bounds of conventional social behaviour - on sex, drugs, activism, or what have you. A teacher must never set a bad example for his students.

In a general way, there is little doubt that public responsibility and participation increases with the amount of schooling. We have already noted, for example, that both the crime rate and the incidence of violent crime decreases as the amount of schooling increases (see Tables 7 and 8.). Concern about the environment would also appear to be a measure of socialization, as indicated earlier. The positive correlation between the level of such concern and the amount of schooling is not only a common perception but is also well-documented, as indicated by the Gallup Poll results of Tables 58 and 59.

TABLE 58⁽⁴⁶⁾

CONCERN ABOUT OUR NATURAL SURROUNDINGS

The question: *You may have heard or read claims that our natural surroundings are being spoiled by air pollution, water pollution, soil erosion, destruction of wildlife and so forth. How concerned are you about this -- deeply concerned, somewhat concerned, or not very concerned?*

	<u>Deeply</u> <u>Concerned</u>	<u>Somewhat</u> <u>Concerned</u>	<u>Not Very</u> <u>Concerned</u>	<u>No</u> <u>Opinion</u>	<u>Total</u>	<u>Number of</u> <u>Interviews</u>
	%	%	%	%	%	
<u>By Education</u>						
College	62	32	6	*	100	(395)
High school	52	37	10	1	100	(748)
Grade school	39	34	20	7	100	(352)
Undesignated - 8						

TABLE 59⁽⁴⁶⁾

WILLINGNESS TO PAY TAXES TO IMPROVE NATURAL SURROUNDINGS

The question: *How much would you be willing to pay each year in additional taxes earmarked to improve our natural surroundings - a small amount such as \$10.00 or less, a moderate amount such as \$50.00, or a large amount such as \$100.00 or more?*

	<u>Small Amount</u>	<u>Moderate Amount</u>	<u>Large Amount</u>	<u>None</u>	<u>Don't Know</u>	<u>Total</u>	<u>Number of Interviews</u>
	%	%	%	%	%	%	
<u>By Education</u>							
College	45	30	12	5	8	100	(395)
High school	52	20	2	9	17	100	(748)
Grade school	54	6	1	12	27	100	(352)
Undesignated - 8							

There seems little doubt that the social reporter could assemble extensive data which expands on the foregoing and thus demonstrate that schooling is one of the strongest, if not the strongest element in the socialization of upcoming generations. Such would be useful documentation, for it might draw attention to the dangers of over-socialization and identify a pressure point for the relief of the associated over-stabilization. While Canada takes due pride in its general conservatism of political action (note the strong aversion to events in Quebec) and its low key life-style, it must also answer for its low level of artistic creativity and technological innovation, activities which are probably negatively correlated with the degree of socialization.

In view of the often insidious character of the process in which all teachers participate, it is not surprising that they feel justified in exacting a fair price from society for the service. Oscar and Mary Handlin, in a historical review of the socialization process in the U. S., have remarked that:⁽⁹³⁾

From generation to generation, however, through all these transformations, the university was also the house of men for whom learning - the pursuit of truth - was an end in itself and for whom the service of rearing the young was the price paid for the tolerance to pursue their own interests. A full history of the university might well balance the two elements; and in any estimate of future prospects, a significant question will certainly be the extent to which the obligation of socialization will remain compatible with scholarship.

8.4 Aquisition of Knowledge and Skills

No one can doubt that there is a direct relation between the knowledge and skills of the labour force and its productivity. Less obvious is the relation between the amount of schooling and productivity. Nonetheless, the tacit assumption that the amount of schooling is a good proxy for knowledge and skills is invariably made. The reason is understandable, of course, for schooling has exact measures while knowledge and skills do not.

There is a growing conviction among educationists and economists that the use of amount of schooling as a measure has severe limitations, and when it is used as at present as a nostrum for a range of economic ills, it is bound to lead to serious misallocation of public funds in short supply. The required alternative measures of educational output are just now in the process of development^(6, 90, 94) and in the closing paragraphs of this section we will comment on these new perceptions and developments. We proceed now with a conventional analysis based on schooling as a proxy for educational output.

It has been estimated that from 1911 to 1961 better education in Canada has raised the labour earnings per man by 30%, or one quarter of the rise in output growth per employed person.⁽⁹⁵⁾ Yet this is only about one half of the achievement in the U.S. The 30% shortfall in productivity of the Canadian labour force in relation to the American, as documented in Fig. 8 , may be

attributed in part to a growing gap in educational attainments during most

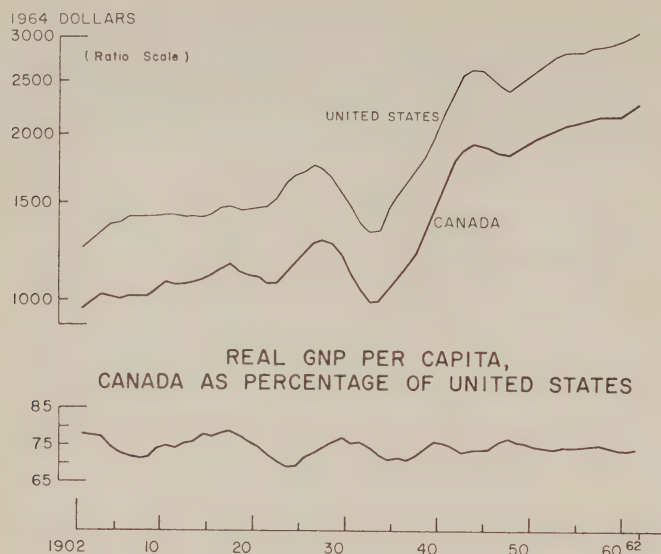


Fig. 8 Comparison of gross national product per capita, Canada and United States⁽⁹⁵⁾

of the period, as indicated in Fig. 9.

Of course education was not the only factor holding back Canadian growth in relation to American. Canada has been less able to benefit from economies of scale, it has maintained restrictive tariff policies which protect inefficient firms and industries and it has been slower to utilize technical and managerial knowledge and skills. The latter may, of course, be a second order effect of the educational short-fall.

Since 1950 there has been a marked effort in Canada, as in other Western countries, to close the educational gaps, as indicated in Fig. 9 and Tables 60 and 61. The OECD projections in Table 60 suggest that with continuation of current trends the Canadian schooling rate will be roughly equal to that in the U. S. by 1980.

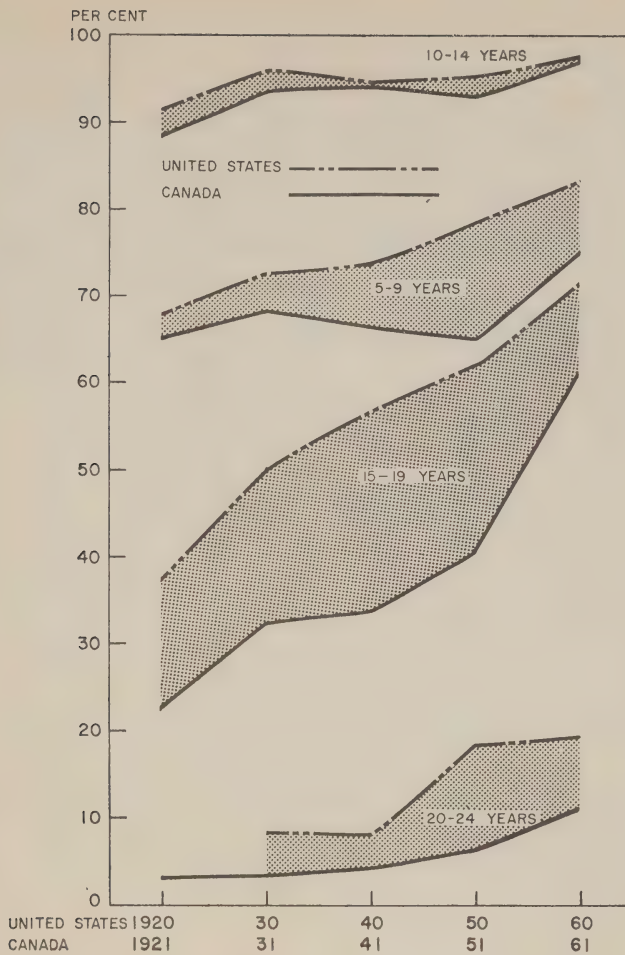


Fig. 9 Male enrolment in school as a percentage of total male population in age group, Canada and United States

Enrolment ratios of males 20-24 years of age, who were mainly in universities, can be compared between Canada and the United States for the decennial years 1931-61. The data show that the comparative proportion for Canada was lowest in 1951, with Canadian university enrolment amounting to only 35 per cent of the U.S. (95)

TABLE 60⁽⁹⁶⁾**ENROLMENT RATIOS IN 1950, 1965, 1980 (as a percentage of the age group)**

	<i>Primary & Secondary</i>			<i>Higher</i>			<i>Total</i>		
	1950	1965	1980	1950	1965	1980	1950	1955	1980
GERMANY	76	77	83	4	9	24	59	59	69
AUSTRIA	72	75	88	4	9	22	56	58	73
BELGIUM	77	95	110	5	15	28	57	79	88
CANADA	72	85	96	7	24	56	56	74	86
DENMARK	65	74	78	7	14	23	52	59	66
SPAIN	43	57	70	3	7	13	32	46	56
UNITED STATES	85	88	94	20	41	58	69	79	86
FINLAND	60	66	70	4	12	15	46	55	56
FRANCE	74	87	92	6	17	31	55	73	77
GREECE	..	..	79	2	11	48	..	..	71
IRELAND	79	92	92	..	10	14	..	78	76
ITALY	56	71	93	6	11	24	43	58	78
JAPAN	70	79	72	5	12	23	55	62	61
LUXEMBOURG	73	78	82	..	..	..	..	..	..
NORWAY	60	71	75	..	11	24	..	58	63
HOLLAND	82	86	101	6	14	17	64	71	83
PORTUGAL	31	49	61	2	5	6	24	40	49
UNITED KINGDOM	68	72	82	5	12	20	52	58	69
SWEDEN	56	69	94	5	13	26	43	54	79
TURKEY	24	41	61	1	4	4	19	35	49
YUGOSLAVIA	42	66	92	3	14	40	33	55	79

TABLE 61⁽⁹⁶⁾

TRENDS FOR PUBLIC EXPENDITURE ON EDUCATION OVER THE PAST 10 OR 15 YEARS IN OECD COUNTRIES

Country	Period	(1) Annual growth rate for expenditure on education	(2) Annual growth rate for GDP (1955- 1967)	Public Expenditure on Education as a % of				Current public expenditure on education as a % of public expenditure on goods and services	
				GNP		National Income		1955	1965
				1955	1965	1955	1965		
Germany*	1950-66	9.3	5.1	2.17	2.93	2.80	3.84	12.1	12.5
Austria	1957-66	9.3	4.4	3.11	3.68	3.98	4.79	22.9	21.3
Belgium*	1958-67	8.6	3.9	3.25	5.17	3.99	6.48	25.4	34.9
Canada	1954-65	13.5	4.3	2.67	5.66	3.50	7.63	16.8	34.6
Denmark	1955-66	11.4	4.8	3.27	5.49	4.00	6.98	19.0	27.4
Spain	1950-66	10.4	7.0	1.08	1.96	1.24	2.27	9.6	15.3
United States*	1955-67	8.2	3.8	3.35	5.10	4.07	6.28	15.1	22.4
France*	1952-67	11.0	4.9	2.83	4.55	3.73	6.05	17.5	28.0
Greece	1950-66	12.2	6.3	1.50	2.10	1.78	2.55	11.2	—
Ireland	1950-65	5.7	2.9	2.86	4.16	3.45	5.20	21.1	26.0
Italy	1957-65	13.7	5.3	2.98	5.19	3.79	6.48	—	29.5
Japan*	1950-65	9.8	9.6	4.56	4.55	5.70	5.64	34.0	36.5
Norway*	1950-67	7.4	4.4	3.37	5.38	4.27	6.98	19.1	24.3
Netherlands*	1950-67	11.4	4.4	3.57	6.19	4.41	7.53	20.5	33.2
Portugal	1950-65	6.5	5.4	1.58	1.44	1.81	1.66	11.3	10.0
United Kingdom*	1953-65	7.8	3.0	2.67	4.17	3.32	5.21	13.5	20.7
Sweden	1957-65	10.0	4.3	4.14	6.41	—	—	20.2	26.0
Switzerland*	1955-64	7.9	4.4	3.07	3.61	3.58	4.31	23.6	25.2
Turkey*	1950-67	9.5	4.6	2.17	3.76	2.50	4.37	—	—
Yugoslavia*	1952-67	17.5	8.5	2.22	4.33	2.47	4.68	—	—
Iceland			4.5	2.73	4.34	3.44	5.6		
Luxembourg			2.7**						

(1) Average annual growth rate for public expenditure on education at 1957 prices.

Current expenditure has been deflated by the cost of living index, and capital expenditure wholesale price index for building material.

Figures in parentheses are Secretariat estimates.

These figures have been revised by the National Statistical Services.

(2) Average annual growth rate for GDP (constant prices) calculated by OECD using the first and last years of the period. For Yugoslavia Gross Material Product between 1956 and 1967 has been used.

Austria, Ireland and Sweden: percentages calculated for 1954.

Spain: percentages calculated for 1954 and 1966.

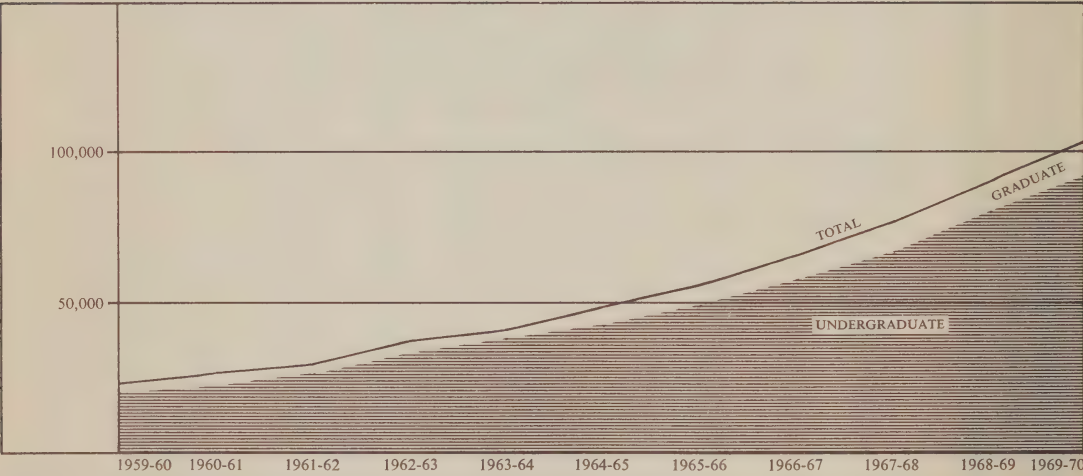
Switzerland: percentages calculated for 1956 and 1964.

Yugoslavia: constant 1956 Gross Material Product and Net Material Product.

** Luxembourg: Secretariat estimates.

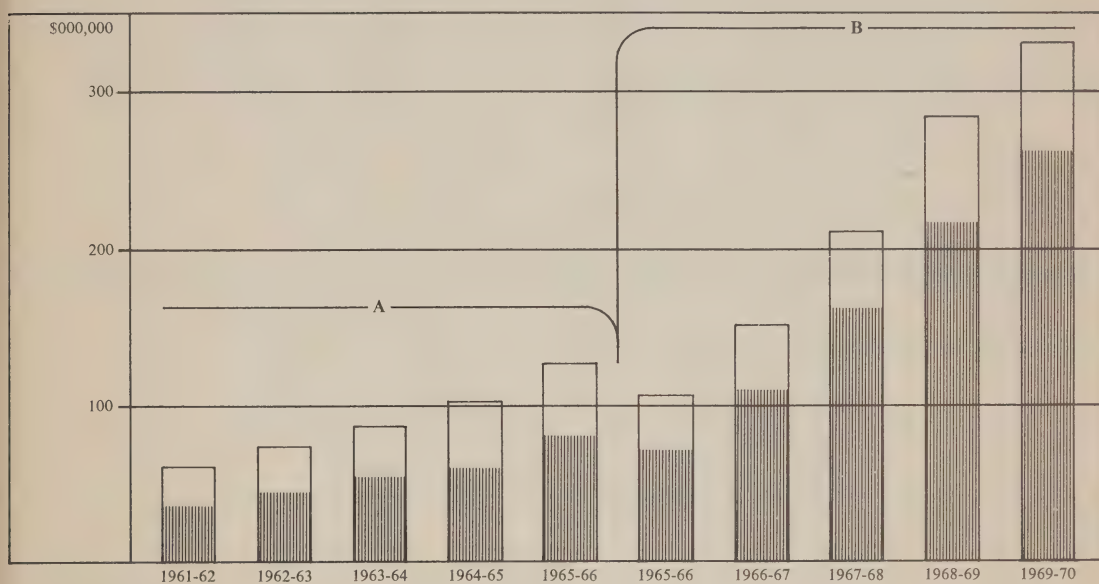
Such rapid growth is being achieved in Canada through an unprecedented charge against the national income (see Table 47) as Table 61 indicates. In 1965, we led the world in this measure of activity in the educational field.

Following an impetus provided by the Economic Council of Canada and the Commission on Financing Education (Bladen Commission, 1965)⁽⁹⁷⁾ Canada embarked on a crash program in higher education which is just now stabilizing after a decade of furious activity. The growth figures for Ontario given in Figs. 10 and 11 are fairly typical of the entire Canadian scene. University



NOTE: Figures for 1959-60 to 1961-62 are from the Department of University Affairs and exclude enrolment at Waterloo Lutheran University. Figures for the years 1962-63 to 1968-69 are from the Dominion Bureau of Statistics and include the 14 provincially assisted universities, Waterloo Lutheran University and Royal Military College of Canada. Figures for 1969-70 include the same institutions and are from the Department of University Affairs.

Fig. 10. Ontario university enrolment 1959-60 to 1969-70⁽⁹⁸⁾

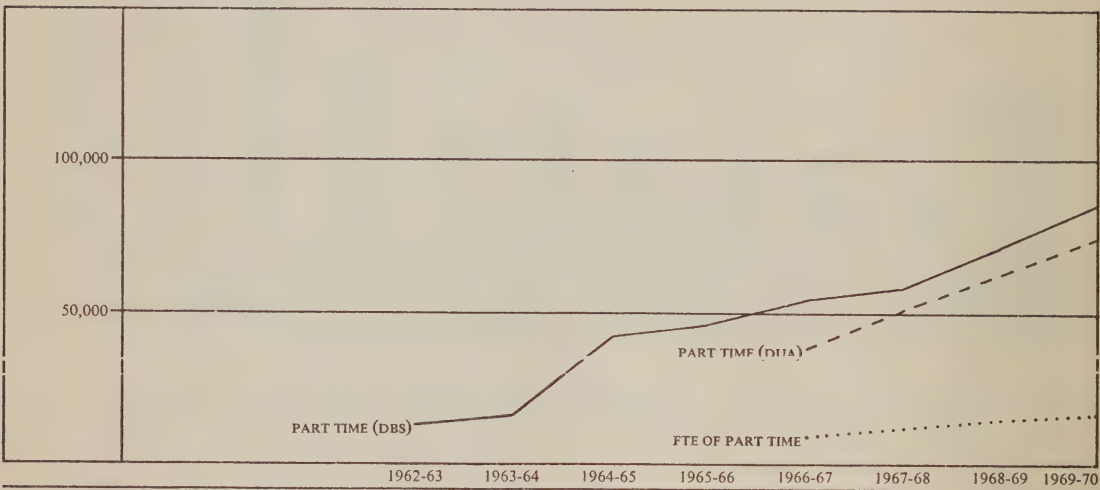


NOTE: Statistics for part A come from the Dominion Bureau of Statistics and include all provincial institutions, as well as both federal and provincial grants. Statistics for part B come from the Department of University Affairs, and include only the 14 provincially assisted universities; federal grants for 1965-66 and 1966-67 are also included.

Fig. 11. Operating grants in relation to total university revenue 1961-62 to 1969-70⁽⁹⁸⁾

enrolment, for example, has more than quadrupled during the decade 1961-70 while operating expenditures have increased by more than five times. The public proportion of the latter quantity has increased from about 60% to 80% of the total. Capital expenditures have gone up in similar proportions.

An encouraging statistic is to be found in Fig. 12 which shows a marked increase in part-time studies. This suggests a growing tendency towards non-consecutive and adult education.



NOTE: Dominion Bureau of Statistics figures for 1962-63 include winter enrolment only; those for 1964-65 to 1969-70 include both winter and summer enrolment. All DBS figures include programs in education. FTE figures for undergraduate programs are calculated by dividing course registrations by a factor of six; for graduate programs by multiplying actual student numbers by 0.30.

Fig. 12. Part-time enrolment at Ontario universities 1962-63 to 1969-70⁽⁹⁸⁾

While the proponents of further expansion argue that we still have a long way to go to catch up to the U.S. in higher education (27% participation by the post-secondary age group as compared to 45% in the U.S.), the public and the press have been increasingly demanding accountability of the educational system. Such accountability comes down to measures of the outputs of the system and the magnitude and distribution of the benefits which accrue.

The accounting of educational attainments in the labour force up to 1961 is given in Table 62 as a comparison with U.S. attainments up to 1960. There is a clear pattern of lower Canadian attainment in all age groups.

TABLE 62⁽⁹⁵⁾
Educational Attainment of the Male Labour
Force by Age Groups, Canada 1961 and United States 1960
(Percentage distribution)

Age Group	Total	0-4 Years Elementary School		5-7 Years Elementary School		8 Years Elementary School		1-3 Years High School		4 Years High School		Some University Education		Complete University Education	
		Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can. ¹	U.S.	Can.	U.S.
1, 25-64.	100.0	7.5	5.8	20.8	12.4	17.6	16.0	29.7	20.5	8.7	24.6	10.1	9.5	5.6	11.1
34	100.0	3.9	3.2	14.6	7.9	19.5	9.8	33.8	21.9	8.7	30.8	13.5	11.7	6.0	14.7
44	100.0	6.1	4.5	21.4	9.9	15.0	12.9	31.6	21.4	9.5	29.5	10.1	9.9	6.3	11.9
54	100.0	9.5	6.9	23.4	15.3	17.8	20.1	27.3	20.7	8.5	20.0	8.4	8.3	5.0	8.8
64	100.0	15.3	11.1	29.1	20.1	18.3	26.1	20.3	16.6	7.4	12.2	5.3	6.9	4.2	7.0

¹Includes Grade 13 for provinces in which Grade 13 is given.

In particular, only about half the percentage of Canadians in the labour force have completed university as have done so in the U.S. While the production of graduates has been substantial in the past decade (Table 63) this can have had only a marginal effect on the educational composition of the work force to date. If as an economic goal the policy were to bring the Canadian

TABLE 63⁽⁹⁹⁾ANNUAL RATES OF GROWTH IN DEGREE PRODUCTION
49 CANADIAN UNIVERSITIES AND COLLEGES

Year	Under-graduate Degrees	Annual Rate of Growth	Graduate Degrees	Annual Rate of Growth	Total Number of Degrees	Annual Rate of Growth
1956-57	12,428		1,574		14,002	
1957-58	13,485	8.5	1,665	5.8	15,150	8.2
1958-59	14,461	7.2	1,872	12.4	16,333	7.8
1959-60	15,120	4.6	2,272	21.4	17,392	6.5
1960-61	16,300	7.8	2,589	14.0	18,889	8.6
1961-62	18,709	14.8	3,121	20.5	21,830	15.6
1962-63	20,897	11.7	3,818	22.3	24,715	13.2
1963-64	24,517	17.3	3,955	3.6	28,472	15.2
1964-65	28,018	14.3	4,530	14.5	32,548	14.3
1965-66	31,137	11.1	5,832	28.7	36,969	13.6
1966-67	35,148	12.9	6,999	20.0	42,147	14.0
1967-68	41,250	17.4	8,331	19.0	49,581	17.6

labour force up to American educational standards, it would require sustaining the current levels of growth ($\sim 11\%$) to at least 1980, where Canadian participation in higher education would equal that in the U.S. (Table 60), and then sustaining the 1980 level to beyond the year 2,000. Fifty years of neglect and shortfall in nurturing the labour force cannot be remedied overnight.

A second kind of measure of output performance has to do with the productivity of the school system. Hettich, reporting for the Economic Council, has developed a productivity index for a group of 49 universities and colleges.⁽⁹⁹⁾ This measures a weighted degree output per cost unit and expresses this over time as a percentage of the value for the base year 1956-57. When the foregone earnings of students are left out of the costs, the analysis gives Fig. 13.

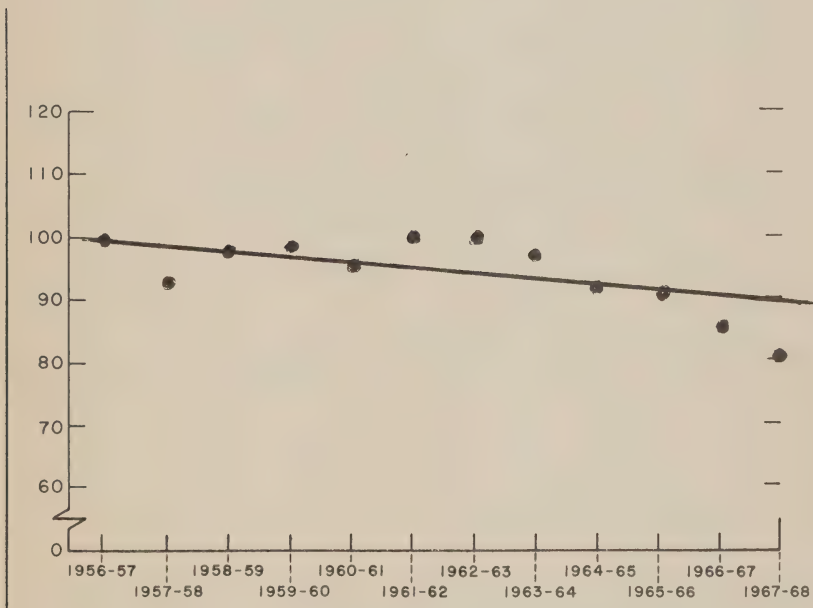


Fig. 13. Productivity indices: Total resource use; 49 universities and colleges⁽⁹⁹⁾

On the average this shows a productivity decline of about 1% per annum, a not unreasonable figure considering the labour intensive character of the educational enterprise.*

Foregone earnings,** or if one prefers, the students' time, is one of the major resource inputs. If this is taken into account as indicated in Fig. 14, the productivity index drops at a rate of about 3% per annum. This reflects among other things the real income growth of high school graduates. If with many Canadian economists one accepts foregone earnings as a legitimate

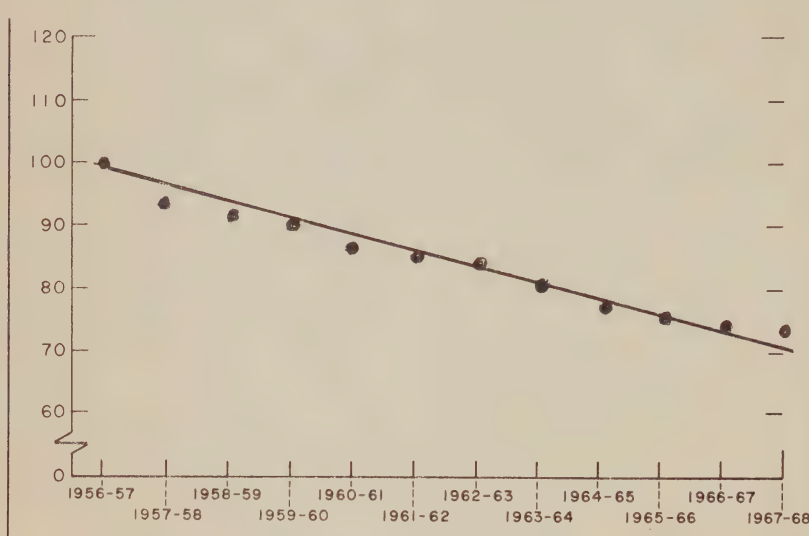


Fig. 14. Productivity indices: Total resource use; 49 universities and colleges (99)

cost item, then it is apparent that major improvements in productivity can only be achieved through a substantial reduction in the time required for reaching a given level of schooling. Within this economic framework there might be a case for increasing the number of teachers and resources per student with a view to shortening the students' stay in the institutions.

* Teaching like many other service activities is regarded as labour-intensive since the innovation rate in methodology is essentially zero. Teachers nonetheless have to share in general rise in productivity through proportionate salary rises.

** A university student is assumed to forego the amount he would have earned if he had gone to work immediately after high school.

While degrees are outputs of a kind, there is no hint in such enumerations as to what value has been added to the participants. Individual income, or discounted lifetime earnings, is often taken as a measure of value of the various classes of graduates, it being supposed that an ideal free-market economy pays people what they are worth.* A first rough measure of the way society rewards individuals on the basis of education is represented in Fig. 15. A more sophisticated and detailed measure of individual benefit

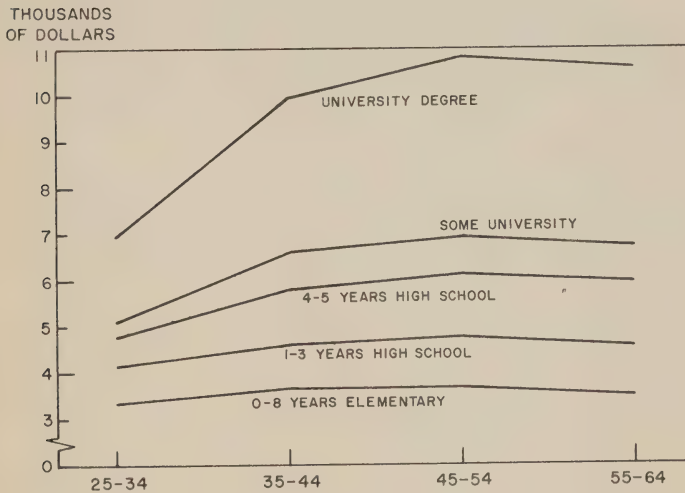


Fig. 15. Incomes by age group and education level male nonfarm labour force, 1961⁽⁹⁵⁾

* Naturally, the monopolistic powers of various segments of the labour force confound this simple concept to such an extent that value orders are often broken.

is given by the "net present value", which is the effective capital value of a given diploma or degree at the time of graduation, discounted according to the relative intellectual attributes of the various professional classes and for foregone income.* Table 64, second column, represents the estimates of SRG for the 1969 graduating class in Ontario⁽¹⁾.

TABLE 64^(1, 100)

Individual Benefits

PROGRAM	NET PRESENT VALUE (\$) (1969 funding)	NET PRESENT VALUE (50% of costs to students)
1. Dentistry	95,348	78,024
2. Medicine	75,551	53,858
3. Law	45,789	33,542
4. Veterinary Medicine	34,291	24,411
5. Pharmacy	25,492	18,496
6. Agriculture	17,938	8,693
7. Architecture	16,769	5,503
8. Commerce	11,855	5,273
9. Forestry	11,829	4,980
10. Library Science	11,364	2,508
11. Engineering	11,307	3,267
12. Social Work	8,455	-358

Ontario government funding up to the present has tended to reinforce this societal valuation of the various degree programs. For medicine in 1970-71 it granted \$8,250 minus \$675 (fee) for each student while for engineering it granted \$3300 minus \$545 (fee) for each student.

The relatively high NPVs in column 2 are related to the

* If the NPV were invested at time of graduation at about 7% interest it would generate an amount at compound interest which is equal to the difference between an average professionals reported lifetime income and that of a high school graduate of the same year.

fact that student fees in Ontario currently cover only about 14% of operating costs. If these fees were increased for the professions to 50% of the costs, as suggested by COPSEO, the NPVs change to those listed in column 3 of Table 64⁽¹⁰⁰⁾. Undoubtedly all non-professional degree programs would then have zero or negative NPVs in this system of accounting.

In a perfect steady state meritocracy accurately evaluated NPVs (discounted for ability as in Table 64 and for the disutilities of training and professional practice if they exist) would all be zero. Large positive entries such as in Table 64 (give or take \$5,000 for possible error) therefore represent monopolistic or other pathological defects in the societal structure. It is not at all surprising that professional engineers in Ontario are presently trying to unionize, for their professional monopoly is evidently a failure.

This somewhat tendentious discourse leads us directly into the touted function of education as a vehicle for those ambiguous outputs known as social mobility and equity (we discuss these in the light of our reservations in Chapter 6). In the last decade or so increased expenditure on education, and on higher education in particular, has been justified in part as providing an accessible doorway for the entry of the children from the lower socio-economic classes into the high return professions. The logical weakness of the basic premise has not escaped notice and the justification has necessarily been qualified by the provision of substantial aid for student participants from poor families. The awards program in Ontario, accepting the premise and the qualification, has grown substantially faster than the system as a whole, as demonstrated in Fig. 16.

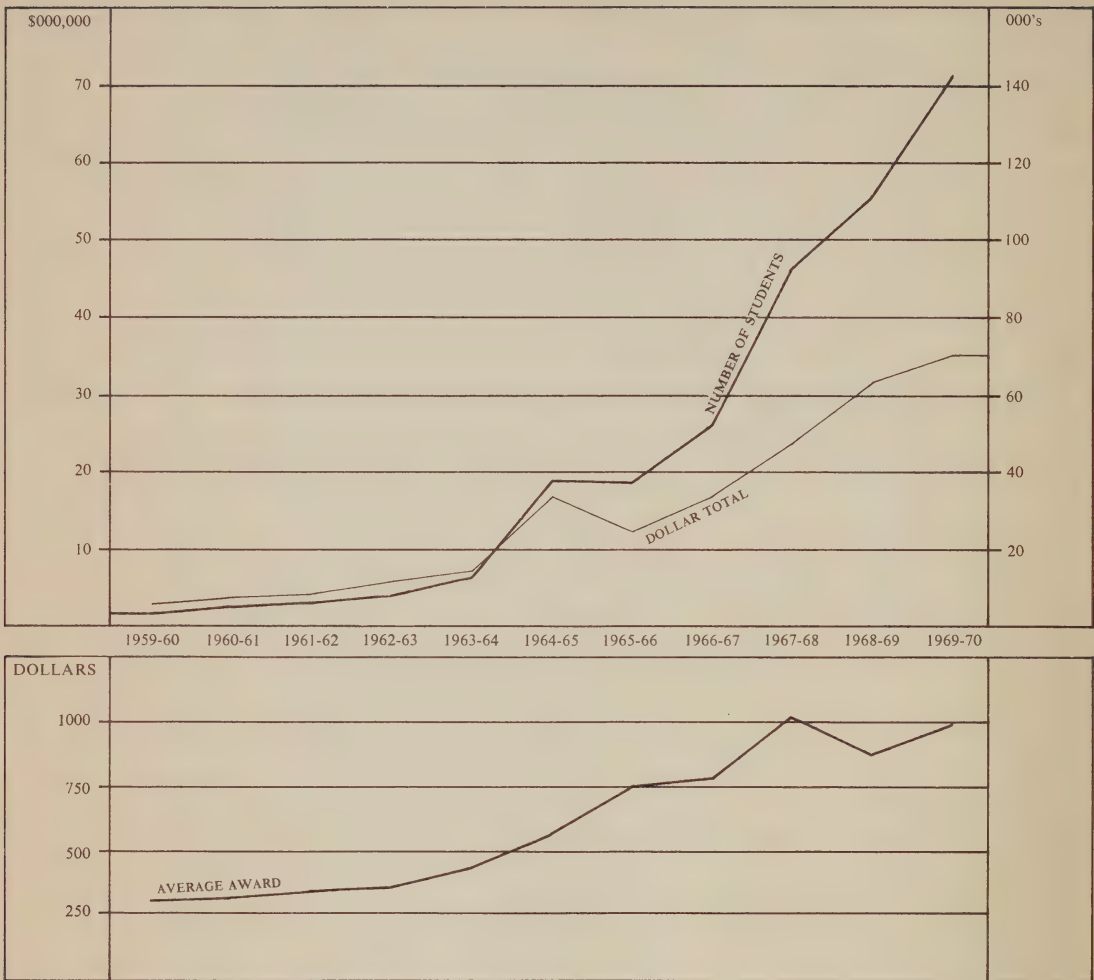


Fig. 16. Numbers of students assisted and average awards, 1959-60 to 1969-70

A broad measure of achievement towards accessibility via the educational and aid programs in Ontario can be inferred from Table 65, which compares post-secondary (mainly university and CAAT) student family income with Ontario family income. This suggests, as expected, a higher than proportional participation by students from the highest income group and a participation rate by students from the lowest income group which is lower than that expected. This latter shortfall is 14%, a surprisingly small amount, considering the strong emphasis placed upon it by educational policy-makers. Put another way, this disproportionate shortfall can be attributed to only 1.2% of Ontario families.

TABLE 65⁽¹⁾

PERCENTAGE DISTRIBUTION OF ONTARIO
POST-SECONDARY STUDENT FAMILY INCOME 1969⁽¹⁾

Under \$3000	\$3000- 4499	\$5000- 6999	\$7000- 9999	\$10000+
6.9	10.6	21.1	26.4	35

PERCENTAGE DISTRIBUTION
ONTARIO FAMILY INCOME

Under \$3000	\$3000- 4999	\$5000- 6999	\$7000- 9999	\$10000+
8.1	10.4	19.8	29.8	31.8

The shortfall among the \$7,000-\$9,999 group is proportionately of the same magnitude (~10%) so purely economic explanations for the marginally depressed participation of the lowest income group is untenable.*

A further measure of equity in the post-secondary education field is to be found in the distribution of tax burden in relation to participation of income groups as recorded in Table 66. Subject to the reservation in Chapter 4 to the effect that reported and taxable income of the higher income

TABLE 66⁽¹⁾

INCOME REDISTRIBUTION ANALYSIS

All Post-secondary Institutions, Ontario

Income Classes

COMPONENT	Under \$2,999	\$3,000- \$4,999	\$5,000- \$6,999	\$7,000- \$9,999	\$10,000+
Societal Cost (%)	8.86	16.58	23.65	22.66	28.25
Student Benefit (%)	8.98	12.24	19.94	24.93	33.91

groups tends to be understated, the sharing of the cost burden is quite equitable (or neutral in economic terminology).

Some further insights into these apparently favourable statistics can be obtained by examining the influence of the Colleges of Applied Arts and Technology (CAAT). These were brought into being in 1965 on the base of a few existing technical colleges to provide community-oriented alternatives to the standard university post-secondary pattern. During the intervening six years their enrolments have grown to about 25% of the post-secondary population. Yet as Fig. 10 shows, the growth pattern for universities suffered no noticeable deficit due to the competition. It must

* This is not to dismiss those small, grossly disadvantaged groups, such as the inner city poor and the Indians, whose numbers have no effect on the broad statistics.

therefore be that substantial new segments of the population are being serviced by this alternative pattern. These segments are evidently the lower socio-economic groups, as Table 67 demonstrates.

Table 67 also says something about the relative mobilities of

TABLE 67^(101, 102)

Socio-economic Background of Students By Father's Educational Attainments

	CAAT		University	
Father's Education	Percentage		Percentage	
	Parents	Students	Parents	Students
0-8 Years of Schooling	31.1	0	22.9	0
9-12 Years of Schooling	47.2	0	32.9	0
13-16 Years of Schooling	13.9	100	24.1	30
16+ Years of Schooling	7.8	0	20.1	70

those who enter the CAAT stream and those who enter the university stream. Assuming that 100% of CAAT students gain 13 years schooling and few go beyond 16 years, and that 70% in the university stream attain 16 or more years of schooling (the 3-year pass level) we can construct the student attainment profiles as shown in Table 67. Fig. 17 gives the difference between students' and parents' profiles as an index of mobility for these particular cohorts. This suggests that the CAATs may be providing for their students a strong first boost up the socio-economic ladder but that another generation or more will be required to establish whether they are providing staging posts for further advance or dead-ends for socially and intellectually disadvantaged kids. If in the meantime CAAT graduates were

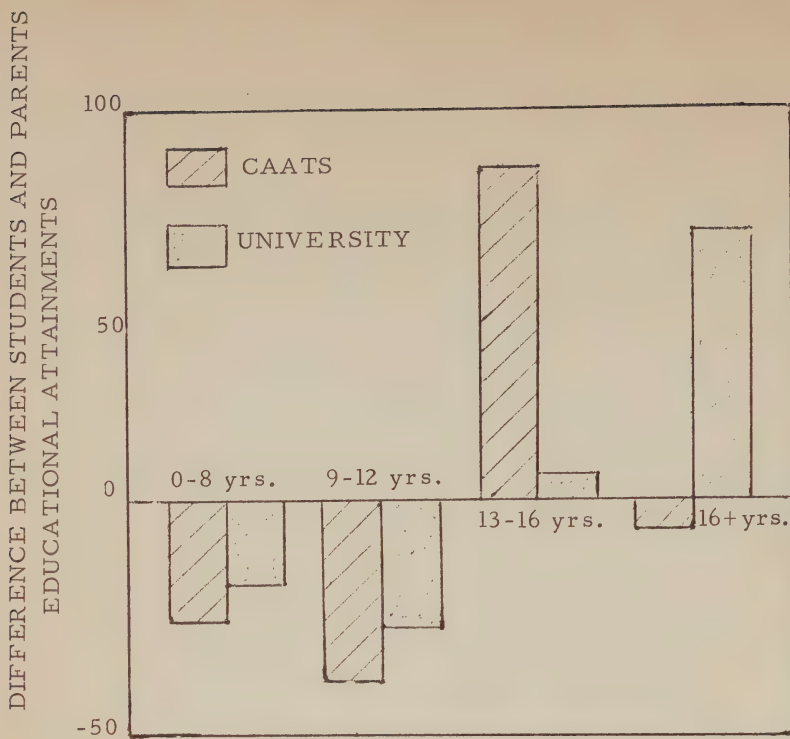


Fig. 17 Relative mobility of CAAT and university students (see text and Table 67)

to prove themselves to be worthy competitors to degree holders in industry and commerce, and certification procedures were relaxed to recognize this, then we would recognize a further indicator of progress towards true equity.

The foregoing analysis indicates that although Ontario has made considerable progress on accessibility to some form of post-secondary education it has to date by no means succeeded in assuring equitable access to the highest income employment for youths from the lower socio-economic class (compare Figs. 17 and 15). If account were taken of the fact that the higher economic groups have less need for certified educational attainment to gain entry to high income employment, the present shortfall from equity would appear even greater.

Head counts of degrees and diplomas and life-time earnings (or NPV) are imperfect and often misleading measures of educational output. We

have already noted the strong monopoly effects in the life-time earnings measure and we now draw attention to the fact that a degree or diploma is first of all a measure of time spent in an institution. Using "time-spent" as a proxy for "value-added" is a very chancy business, yet current recruiting for industry and commerce is based on this equation. A clue as to the reliability of this time-honoured procedure has been given by Astin⁽¹⁰³⁾. On comparing students from a group of the most affluent colleges with those from least affluent colleges in the U.S. on the basis of college entrance and graduate record scores, he found no differences in performance after graduation that could not be explained by differences in native intelligence. This suggests in effect that for the undergraduate students, universities and colleges serve mainly as resource places and centres of discipline and criticism; that the renown of the professors, the student-faculty ratios and the quality of the libraries are essentially irrelevant; that those persons who have the intelligence and self-discipline could easily match the degree level of achievement without institutionalization and in a shorter time. Indeed many persons reach the degree level by self-education and many more would be motivated to do so were it not for the fact that the degree is established as the universal criterion for certification of such achievement.

If such perceptions are correct, and we believe they are, then they have far-reaching policy implications. Some of these have been developed in the Draft Report of COPSEO. However, there is no way that progress can be made on a broad front before these perceptions have been rigourously documented. Besides the socialization and maturation processes that obviously go on in the educational institutions, is there an effective increase in logic and language skills? Are students incited to creativity or are their natural creative tendencies stifled? Some progress is now being made in quantification in these areas through academic research.

Evaluation of outputs is not the sole prerogative of the educational system or its contractors. Responses of the labour market and societal reactions generally may turn out to be the best indicators of all. During the past decade the market value of the bachelor's degree has suffered a

continuous decline^(101, 104) This is due in part to a decline of opportunities in the teaching profession and a marked increase in the number of graduates. The result is that employers are artificially escalating educational requirements to take advantage of what may appear to be a bonanza of talent. Paradoxically, such over-educated workers may have lower productivity and higher turnover rates (due to frustrated expectations) than regularly qualified workers⁽¹⁰⁴⁾.

The point of all this is to draw attention to the fact that the market may ultimately define the B. A. - B. Sc., its character and its role in society with far more precision and pertinence than any committee of academics.

8.5 Public Service

While most persons involved would agree that educational institutions perform a substantial public service function outside education, few would agree that this is a major function. Yet, this is our present thesis. We maintain that the accountability of the institutions must include a quantified ledger for the plethora of direct and indirect service activities. We refer the reader to the list of public service functions on p.154 and ask her (him) to contemplate placing a dollar value on these outputs. What is the dollar value to a community in respect to the attraction and stimulation of industry? For a start, the direct benefit to the local building trades can be estimated. During the past decade over \$200 millions capital has been invested in post-secondary institutions in Hamilton alone. Perhaps half of this has been distributed as pay-checks to the citizens of Hamilton. In other words, as well as a huge capital plant, Hamilton has received a goodly proportion of its tax dollars back in cash, the government acting only as an intermediary in the transaction.* In a similar way, over 50% of operating funds end up in the pockets of Hamilton citizens.

Screening for the labour market is a very important function of the educational system. The students begin streaming in the high school.

* We will undoubtedly be accused of double counting by the economists. We suspect however that the builders and the city fathers would see it our way - and that is perhaps what matters.

If they proceed beyond this they are thrust into that more or less rigorous classification process known as the college curriculum. They come out of the institutions classified into skills, disciplines and professions, and according to academic ability - honours, general and pass. What is the value of this sorting process to the individuals themselves and to society as a whole? What would happen to our \$100 billion GNP if the sorting in the schools was done uniformly badly each year and industry nonetheless relied upon it? Would the GNP be reduced by 1%? If so, we might place an annual value of \$1 billion on the sorting process. This is undoubtedly a high estimate, for in the absence of effective sorting in the schools, industry would itself do a more thorough job at a substantial direct cost to itself. Let us rather suppose that the GNP represents the output of 10,000 firms with average product values of \$10 million. Doubtless firms of this size would be prepared to invest \$10,000 annually to assure that their employees are in the right slots. The total national cost of sorting on this basis would be \$100 million.

Teachers shudder at the attribution of a "baby-sitting" function to their activities. Yet there is no question that the age of compulsory education has advanced as much as a consequence of urbanization and the decline of job opportunities for teenagers as due to the increase in educational needs for modern living. But can a dollar value be placed on this function? One important measure will be recognized when teachers begin to use withdrawal of services as a regular procedure in salary negotiations - for it is under the circumstances of a strike that the hidden baby-sitting function will rise to the fore. To what extent will Boards of Education respond to the complaints of working mothers? How will they stand up to the pressure from the police to get the kids off the streets? We suspect that the answer to these questions will lead to a citizen's assignment of a very high dollar value to this function. For example, if in Ontario some 10,000 mothers were prevented from working due to loss of the baby-sitting service, the cost to them would

be \$30,000,000 per annum.

Finally, we ask, What is the price of stability in the labour market. According to a senior member of the federal government, it is the price of post-secondary education delivered to those persons who are thereby kept off the labour market. While this is probably an over-evaluation, it is not as unrealistic as one might think. What is the cost to society of kids on the dole or in jail as an alternative? A subsidy to youths of \$2000 per annum to allow them to reside in a socializing milieu, to maintain their dignity, and with luck, to gain some skills and knowledge which will make them a little more competitive in the labour market of the future, is probably a cheap price to pay for avoidance of the individual and societal disutilities of the worst of the alternatives.

Such transfer payments have a further stabilizing function in that they represent a partial correction of the societal inequity which is apparent in Fig. 14 . This is the monopolistic effect whereby older and experienced persons, who by and large control the income distribution, specify the highest returns for themselves.

The thrust of this rather speculative discussion is the premise that the public service function in our broad interpretation and the socialization function together represent perhaps the main function of the school system at all levels and that realistic cost-benefit analyses for a social report must take this into account. The policy and information vacuum which currently exists throughout the world with respect to the growth characteristics of post-secondary education stems in our view from a failure of analysis at this very point. The Commission on Post-Secondary Education in Ontario, after three years of deliberation summarizes its depth of understanding of the dynamics of growth as follows:

Since similar expectations have arisen in most countries in Western Europe, as well as in the United States, it is hard to discover any single set of objective social,

economic, or demographic criteria that can be said to predicate the growth of post-secondary education. Both rich countries and poor countries experienced it; so did those with both high and low rates of economic growth. Nor do any demographic characteristics explain the expansion of higher education.... We are, therefore, left only with the unsatisfactory and unsatisfying conclusion that post-secondary education seems to expand when a society desires that it be expanded.

8.6 Creative and Mutative Functions of Schooling

Because the schools, including the colleges and universities, are so strongly committed to the socialization process, creativity, with its strong critical and anti-social components, is bound to be stifled in the institutional milieu. Consequently, it is not a major output of Canadian schools. Yet creative persons - writers, musicians, artists, scientists - tend to have more rather than less schooling than the average, reflecting the necessary skill and experience components of creative activity. Here, the fundamental dichotomy facing the creator rises in its pristine form - the necessary balance between intellectual and skill discipline and the unfettered spirit. The Hall-Dennis Report - *Living and Learning* - has successfully focussed on the problem insofar as it relates to elementary and secondary education⁽¹⁰⁵⁾. Our comments here are therefore reserved for the situation in post-secondary education.

The perceptions of students are important here, so we refer to the survey data previously presented on p.158. It is noted that the test group of

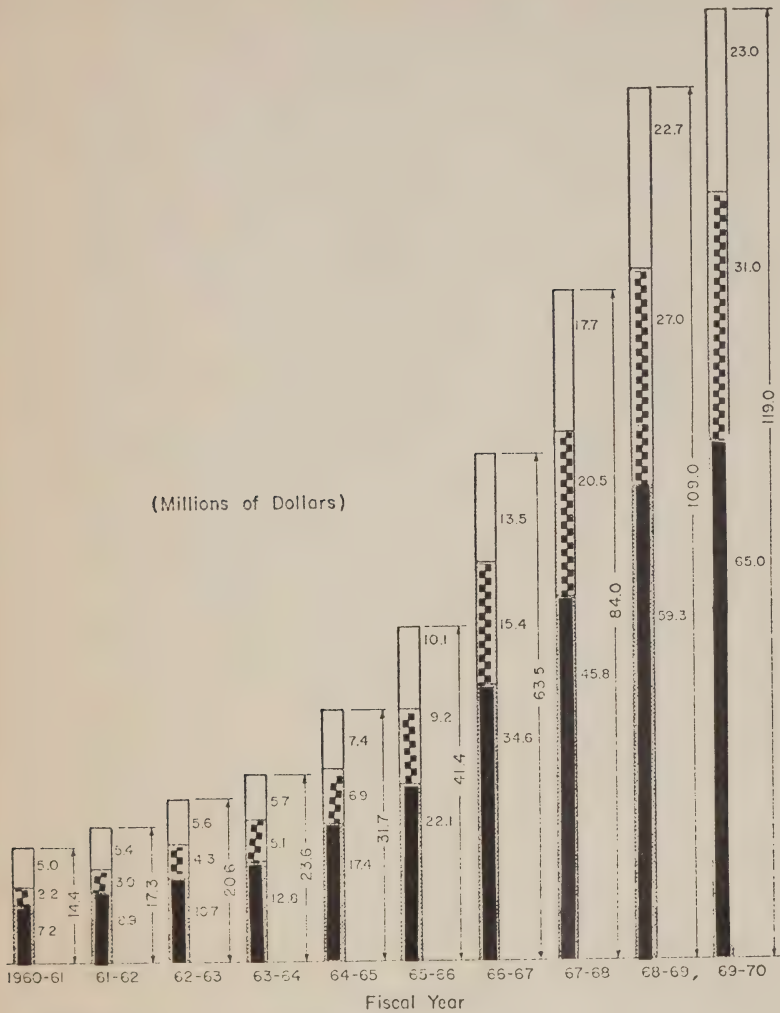
students feel that the most important function of a university should be "to intellectually stimulate and excite" yet they suggest that their university gives low priority to it. These observations complement our impressions of the faculty perception: We have already mastered the discipline and its skills so our activities should be unfettered; the students on the other hand have yet to master the necessary skills and so they must concentrate on these . Creativity is thus an activity reserved in the institutions for the professors; presumably the students will find themselves in the outside world. While the logic and efficiency of this hierarchy seems reasonable, its efficacy is in grave doubt. It is our impression that both the professors and the students in Canadian institutions are over-socialized and often over-trained, so the creative output of both groups is minimal. Creative writing and poetry have almost no place in the university or college milieu while the fine arts and music share but a tenuous foothold⁽¹⁰⁶⁾.

There is a great deal of scholarly activity in the institutions, both in the arts and sciences, but most of this follows patterns established elsewhere. This is not to say that this activity, much of which is of high quality and contains strong elements of creativity, is not necessary and important. It represents in fact a large part of the base for the evolutionary cultural and technological development of society. It does not, however, lead to those breaks in continuity which are the essential precursors of far-reaching qualitative change.

Scholarly activity, or research, has received a strong impetus in Canadian universities as an appendage to the rapid growth in student, particularly graduate student, enrollments. Fig. 18, for example, shows the growth of federal support for scientific activities in the universities during the past decade. This closely parallels the enrollment growth curve of Fig. 10. Support for the humanities and social sciences has also grown, but the level is an order of magnitude lower. For 1969-70 the average grant through the Canada Council was \$500, through the National Research

(107)

Figure 18-Federal Support* for Scientific Activities in the Universities
1960-1961 to 1969-70



 NATIONAL RESEARCH COUNCIL

 MEDICAL RESEARCH COUNCIL

 OTHER FEDERAL DEPT'S & AGENCIES

*Includes Scholarships, Fellowships and various forms of grants.

Council, \$7,933 (for Ontario only) and through the Medical Research Council, \$14,000. This pattern is reflected in the research income distribution within the Arts and Science Faculty of the University of Toronto given in Table 68. The state of inequity is not quite as bad as implied here for a substantial part of university resources go into research holdings of libraries, and this subsidy strongly favours the humanities and the social sciences. Nonetheless, there remains in our view a major shortfall in support for these latter discipline areas. The number of important unresearched problems uncovered in this study alone are strong evidence for the validity of this view.

Further to the identification of research subsidies it must be appreciated that effective research expenditures of the universities are very much higher than their direct research income. The major component of such extra expenditures are contained in professorial salaries, particularly in support of summer research activities. The Economic Council has recently suggested a formula for attributing university expenditures as between instruction and research⁽⁹⁹⁾. Their study suggests that in the research-oriented universities, the expenditures attributable to research may be as high as 40% of the total (Table 69).

We have already noted the slow response of the manpower pool to increased activity in the post-secondary field and have argued that quantitative effects of expansion are not likely to appear in the performance of the economy for more than a decade. The same can be said for university research activity and the closely related output of Ph. D.s. If the current panic response to an apparent overproduction of such highly-trained personnel leads to a major cut-back at this early stage of output, then the policy-makers must immediately reexamine their earlier premise that educated manpower is a major contributor to economic progress. It seems to us that a continuous glut of the most highly-trained persons is an essential element for the working out of the economic thesis, for it

TABLE 68⁽¹⁰⁸⁾

UNIVERSITY OF TORONTO, FACULTY OF ARTS AND SCIENCE, RESEARCH
 INCOME PER FACULTY MEMBER*, ENROLMENTS PER FACULTY MEMBER,
COURSES PER FACULTY MEMBER, 1968/69 (104)

Department	Research Income per Faculty Member
1. Zoology	30,433
2. Physics	27,958
3. Astronomy	20,444
4. Chemistry	16,238
5. Psychology	16,018
6. Geology	14,236
7. Botany	10,893
8. Anthropology	9,094
9. Mathematics	5,367
10. Sociology	2,896
11. Geography	2,490
12. Near Eastern Studies	1,691
13. Slavic Studies	1,200
14. East Asian Studies	1,084
15. French	805
16. Italian and Hispanic Studies	522
17. Classics	358
18. History	344
19. Islamic Studies	157
20. Fine Arts	93
21. Political Economy	80
22. English	12
23. Philosophy	-

* Numbers of faculty are for "full time equivalents" for all departments except Classics, English, French, German, Near Eastern Studies, Philosophy and Religious Studies. These departments are college rather than university departments, and for these faculty members were estimated using the Faculty of Arts and Science calendar for 1968/69. Since this procedure probably overestimates full-time equivalent faculty members, figures in the table for these departments will be slightly underestimated.

Source: Data supplied by University of Toronto.

TABLE 69⁽¹⁰⁸⁾

ONTARIO UNIVERSITIES, RESEARCH INCOME AND ESTIMATED RESEARCH EXPENDITURE (104) 1969-70

	(\$000's) Research Income	%Total Ordinary Operating Expenditure	(\$000's) Estimated Research Expenditure (Hettich formula)	%Total Ordinary Operating Expenditure
Brock	261	4.4%	1533	25.9%
Carleton	1,664	8.0%	6074	29.3%
Guelph	2,528	7.8%	9,455	29.0%
Lakenhead	260	3.3%	1,978	25.1%
Laurentian	208	3.4%	1,529	25.0%
McMaster	5,961	18.3%	12,612	38.7%
Ottawa	2,990	9.4%	9,742	30.5%
Queen's	5,160	17.0%	11,350	37.6%
Toronto	18,255	17.3%	39,870	37.8%
Trent	377	7.4%	1,455	28.7%
Waterloo	4,182	12.4%	11,230	33.3%
Western	6,222	14.8%	14,937	35.5%
Windsor	1,089	6.8%	4,508	28.1%
York	2,241	8.7%	7,670	30.0%

Source: Research Income and Total Ordinary Operating Expenditure are from
DSS-CAUBO Returns.

will be bright persons in the wrong boxes who are most likely to lead Canadian industry into and through major changes towards a higher qualitative level.

The universities and colleges not only fall short of their charge in helping individuals realize their creative powers they also fail badly in their role as critics of society. The institutions, depending as they do for support on powerful individuals, business, and particularly on government, face a real quandary. Critical responses which spring from the campus, whether originating with the students, the faculty or administration will as often as not be interpreted as "biting the hand that feeds them". Unfortunately, the response to the quandary in Canada is, with few exceptions, to adopt a neutral mein (except for a few of the students who don't appear to be taken seriously within or without the institutions).

The colleges and universities must reappraise and reiterate their responsibilities as a primary source of societal criticism for they are accorded custody of most of the resources, the information and the bright young minds which are the essential base for such activities. They must also master the fine art of moderate criticism. Wise governments, for their part must provide the reassurance which will sustain and nurture the activity.

8.7 Overview

It was the talent for learning, or the art of classification, which provided man the wherewithall to graduate from the jungle and a nomadic existence. It is not surprising that the generalized classes of shelter and agriculture and their modern synonyms should remain at the core of the concept of human well-being. That is to say, the materialist survival values are the most fundamental. Yet nature through evolution did accidentally provide the hominoid offshoot with a talent for classification which was more than adequate for survival in a competitive milieu. It allowed him, indeed forced him, to develop a formal language and to express his more subtle class conceptions in the form of jewelry and cave paintings. Thus, it has been in man's make-up since at least Cromagnan times (30,000 BC) that his hungers have demanded both material and abstract satisfaction. In this regard, it is interesting to surmise whether his first attraction to fire was materially or aesthetically motivated.

Learning, as the tabulation of all recognizable classes in nature, has the same equivocal character as the class of objects which converts condensed matter into hot, coloured gas - it fulfills both a material and aesthetic need of man. The brain tissues are just as demanding of nurture as are the fat tissues. This is why education, the formalization of the learning process, has become the mentor and mediator of all modern man's objective and subjective desires and devices - the key to survival, to comfort and self-realization.

The central policy question is not whether learning and the learning process should continue to expand - for expansion of learning is the nature of man, it is whether they are equitably subsidized and shared within the population. All the defects of man and his structures have to do with classification or learning failures. Genetic defects, which lead to congenital disease, poverty, crime, unemployment and pollution can

all be traced to a lack of information vested in structures, groups and individuals. General welfare policy, with education as a tool, must be aimed at eliminating these defect-producing gaps in learning.

9. RECOMMENDATIONS

In its Eighth Annual Review (1971) - Design for Decision-Making - the Economic Council has cautiously and belatedly expressed itself in favour of social reporting. ⁽¹¹⁴⁾ We interpret this as an indication that 1972 is a propitious year for implementation of our proposition as made explicit in the following two recommendations:

Recommendation 1

An agency of the Ontario Government should be established to issue a comprehensive annual social report which includes among others, indicators on the economic and social impact of the educational system; that the terms of reference of the agency as spelled out in its charter require that it:

- a) prepare the report in forms suitable for both public and bureaucratic consumption
- b) stimulate public discussion on the adequacy of the report
- c) and further to item (b), hold regular public hearings
- d) publish from time to time background material on the process and theory of social reporting
- e) make its files freely accessible to all researchers and the public
- f) contract the necessary data-gathering duties to appropriate private and public organizations.

Recognizing the essential coordinative role of the federal government in such matters we envision an independent federal agency with statutory powers combining those of the Auditor-general and the Economic Council. Such an agency would serve as a clearing house and compiler of social data from provincial, national and international sources.

Recommendation 2

The Ontario Government should press the Federal Government to establish an agency which is charged with the development of nation-wide social indicators and a social report based on provincial, national and international data sources.

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APPENDIX TOWARDS A QUANTITATIVE THEORETICAL BASE FOR SOCIAL ANALYSIS

A.1 Introduction

The approach to questions of ecological or social stability to be found in the following pages is original and as yet does not appear in the literature in synthetic form. It is the culmination of a chain of thought which has filtered through the consciousness of scientists like Bertrand Russell, Lotka, Szilard, Schroedinger, von Neumann, Wiener, Turing and Prigogine and artists like van Gogh, Frank Lloyd Wright and Robert Frost. This chain has with one important exception been almost completely ignored by the practitioners of the social and biological sciences. This exception is the "Theory of Games", a mathematical structure which has now permeated the social sciences and is making some inroads into biology.

A.2 The Axiomatic Basis

We suggested in the introduction to this monograph that a viable theory, with static and dynamic components, must give quantitative expression to the dichotomous duality of function which is an evident dynamic characteristic of social and other systems. It is necessary therefore as a start to find a single pair of quantifiers for the semantic duos such as progress and equity, adaptability and stability, mutative and moderate, etc. The following axiom or postulate includes such a pair: —

Stability at the dynamic steady state of any open system (the world, society, the ecosystem, a tree, the body, the brain, etc.) is characterized by a balance between "chemical imperialism"⁽¹⁰⁹⁾ and "dynamic efficiency"⁽¹¹⁰⁾.

This balance of energetic imperatives can be rephrased in the statement that the stable state is simultaneously a minimal and a maximal (minimax) configuration in the rate of loss of available energy to low quality

heat. We will use the term "dissipation" for the latter quantity since it is so-used in both scientific and popular discourse. The maximal part describes the imperialistic tendency of vital systems to maximize their intake of available energy for dissipative purposes while the minimal part corresponds to the tendency to simultaneously and competitively minimize the dissipation by accumulating energy forms within.* The theoretical structure is therefore inclusive of the "self-organizing" tendency of vital systems, the stable state often representing a state of maximum organization.

These tendencies derive ultimately from the physico-chemical laws of nature, and can be justified within current physical theory.^(111, 112) We group them generically under the scientific phrase "cooperative processes" - processes whereby the long range order of a system evolves as a consequence of the binding forces of the parts (e. g., the molecules) of the system.

The stable state may be further characterized by its elements of symmetry - both spacial and dynamic. The closer to stability is a dynamic system, the more symmetry elements are apparent to the sensitive observer. Since aesthetic value is closely related to the number of symmetry elements, the stability of dynamic systems can be indexed to some extent by their aesthetic appeal (trees, buildings designed by Frank Lloyd Wright, waterfalls, fine-bred horses, freeway interchanges, some educational systems, poetry readings of Dylan Thomas, etc.).

We must be careful not to focus solely upon states of stability. Many complex open systems do not in fact have stable steady states. Rather, they have uniform rhythmic states as the end-points of their evolution or they attain a state which continues to fluctuate wildly about some mean configuration. The existence of a stable state depends both on the internal constraints and the external conditions, and if these are incompatible, stability may be unattainable.

* Think of a tree which takes a shape which both optimizes its intake of nourishment from the sun and the soil and minimizes its dissipative losses via a streamlined flow-system for its vital fluids. Both tendencies act to provide for maximum accumulation of available energy (wood) in the trunk. Note too that acquisitiveness and overconsumption are natural human traits attended by fat and intellectual capital accumulation.

(e.g., well-informed and compassionate young people in an educational system operated by rigid and hypocritical adults).

There is another important reason for giving attention to unstable systems. This is because creation or mutation is usually the consequence of resolution of an instability. Such an instability can arise as a result of a large internal fluctuation (or irrational act) or as the result of a strong perturbation from outside the system. Creative and progressive systems must therefore sustain states of marginal stability.

We noted above that there is a close connection between the mathematical Theory of Games, as developed by von Neumann and Morgenstern,⁽¹²⁾ and the approach espoused here. Game Theory speaks formally to the problem of economic competition between entrepreneurs (alone or in coalition) and the environment (as a noncommittal player) in the market place. According to the rules of the game (or market place) the entrepreneurs through successive moves attempt to maximize their earnings or minimize their losses, if losses are inevitable. If the entrepreneurs are "rational" (i.e., if they are logical humans) then each strategic game has one or more "solutions" or stability points corresponding to the end-point of competition. In certain types of games these are "minimax" states of the so-called "pay-off" matrix which indexes the outcome of various probabilistic strategies. The rich literature of this field of mathematics, and in the related field of linear programming, undoubtedly contains most of the mathematical paraphernalia required for quantifying the theoretical approach proposed herein. In the following section we attempt the construction of a model social system.

A.3 Definitions for a Model Social System

The state of every physical (including vital) system evolving at constant temperature and pressure is best described in terms of the function K , known as the available energy or the ability to do work. It is the sum of the

energy of the system E and the information content, I (expressed in energy units), that is,

$$K = E + I. \quad (1)$$

Every piece of mass, every book, every biological unit contains a quantifiable amount of available energy, and every waterfall, every electric light socket and the sun delivers this quantity at a determinable rate. It may seem strange that energy and information can be equated after unit adjustment. Yet ponder for the moment that mass, energy and information are transmitted by light (electro-magnetic radiation) and that in physics they are freely interchangeable. Note, however, that the available energy K , unlike the energy E , is not conserved. This is because the information I can be spontaneously degraded into low quality heat and K along with it, E remaining constant. Alternatively stated, information I , or organization, is not conserved in the universe, whereas energy is.

The dynamic available energy balance of an economic system, a society or a nation can be written as

$$J_{in} - J_{out} = \frac{dK}{dt} + \frac{dC}{dt} = \dot{K} + \dot{C} \quad (2)$$

where \dot{K} is the rate of change of available energy, $\dot{C} = dC/dt$ is the rate of dissipation (or loss) of available energy and $(J_{in} - J_{out})$ is the excess rate of inflow over outflow of available energy.* Since equations (1) and (2) are pure definitions they have no physical or scientific content.

Let the rate of consumption of a system be equal to the rate of dissipation of available energy, \dot{C} . That is, rate of consumption is the rate of conversion of available energy (energy and information) into heat at ambient (room) temperature. This contains the usual sense of energy dissipation.

* A relation such as (2) is a definition of a non-conservative quantity, K . For a conservative quantity there is no dissipation, i.e., $\dot{C}=0$.

We consume food (energy) or information and ultimately reject the wastes as low quality heat.

Now K , the stored available energy, also has a standard meaning.

It is capital, consisting of accumulated commodities, bodies of individuals or information, consumable and non-consumable, physical and intellectual.

The system (or societal) rate of accumulation of capital can be divided between the government (g) and the individuals (i) as

$$\dot{K} = \dot{K}_g + \dot{K}_i \quad (3)$$

and individuals can be further divided into classes C_r so that

$$\dot{K} = \dot{K}_g + \sum_{C_1} \dot{K}_j + \sum_{C_2} \dot{K}_k + \sum_{C_3} \dot{K}_l + \quad (4)$$

Similarly, the consumption rate can be written as

$$\dot{C} = \dot{C}_g + \sum_i \dot{C}_r = \dot{C}_s + \sum_{C_1} \dot{C}_j + \sum_{C_2} \dot{C}_k + \sum_{C_3} \dot{C}_l + \quad (5)$$

The sub-system variables will be related by balance equations of the same form as for society, viz.,

$$J_{i, \text{in}} - J_{j, \text{out}} = \dot{K}_i + \dot{C}_i \quad (6)$$

where the sub-system flows form a network in which each J_i is made up of a societal component (i.e., part of J) and exchanges between individuals, and where each of the \dot{C}_i seeks a minimax configuration. Similar expressions can be written for classes instead of individuals. The elements of a conventional cost-benefit analysis have to do with a quantification of these inter-class flows using dollars as proxies for available energy.

The classes of individuals comprising C_r ($r = 1, 2, 3, \dots$) might be (1) persons with inherited power and wealth (2) persons with large businesses (3) small businessmen (4) powerful professionals (5) other professionals (6) unionized blue collar workers (7) white collar workers (8) unorganized workers and others, criteria being stated so as to avoid overlap. We emphasize that the economic structure is thus far purely definitional. To proceed further we must introduce the physical (empirical or theoretical) content of our basic postulate.

A.4 Optimization of a Social System

A cursory examination of the empirical behaviour of biological and economic systems in relation to equation (2) identifies two common cases. If the available energy input (J_{in}) of a system is fixed, e. g., as in a typical eco-system, the dissipation rate (or consumption rate) tends to a minimum, and the capital K (available energy) tends towards a maximum (every biological niche is filled). On the other hand if the capital K of a system (number of individuals and permanent commodities) is fixed the system tends to maximum consumption or dissipation. The model is accordingly well-suited to the adoption of behaviour implied by the minimax postulate.

The Theory of Economic Games⁽¹²⁾ shows that there is no unique minimax configuration in a complex social system. Indeed there are a large number of stable minimax solutions the occurrence of which depend on the "standard of behaviour" set by the game participants, that is, which depend on the politics of the situation. It is this degree of freedom which justifies the existence of government commissions. Governments and (or) powerful persons can in fact influence the choice between physically non-committal optimal states. They must do this on the basis of aesthetic, religious or political principles. In physical terms, they must specify their conception of the ideal distribution of spacial and dynamic symmetry elements at the optimum.

Simplistic ideologies are based on simplistic symmetry principles. For example, ideal communism ("to each according to his need") suggests optimization towards the symmetry principle

$$\dot{C}_j = \dot{C}_k = \dot{C}_1 = \dots \text{ etc.} \quad (7)$$

The ideal capitalist and social democratic meritocracies ("to each according to his ability") suggest optimization to the symmetry principle that all

$$\dot{C}_i \text{ be proportional to } \dot{K}_i \quad (8)$$

It is our interpretation that in entrepreneurial capitalism the imperative has been to establish a distribution of the \dot{K}_j , \dot{C}_j and \dot{J}_i whereby the net available energy intake of society

$$\dot{K}_i + \dot{C}_i \quad (9)$$

is maximized. Industrial society, in line with our postulate, has tended to maximize through \dot{C}_i with a corresponding depredation of society's fixed capital (the environment). We may hope that the post-industrial period will be characterized by an increase in the natural moderative influence upon \dot{C}_i (the minimal aspect*) and a concomitant recovery of \dot{K}_i through conservation. We suspect that our model in a more precisely articulated form would show uniquely that the achievement of such a global shift will require a shift from symmetry principle (8) toward symmetry principle (7), that is, towards more welfare statism. This certainly seems to be the perception of the current political leadership of all parties.

* Empirical evidence for this minimal aspect of consumption is to be found in the decreased consumption rate of human individuals as they develop from the instabilities of puberty towards stable adulthood.

A.5 The Information Component of Capital

Apart from the well-defined optimal imperatives associated with our model, it hues closely to the conventional model used in systems analysis and in economics. There is, however, another essential difference that is associated with our explicit inclusion of the non-conservative quantity I, designated above as the "information". This is inclusive of conventional quantities like degree of organization, value-added, externalities, aesthetic value, human capital and stored knowledge. Because it is non-conservative, a given unit in one measurement system (e. g., in dollars or in labour - hours added) may be accorded an entirely different value in absolute available energy units. In the simplest terms, a ten-dollar bill usually has less value (in absolute energy units) to a rich man than to a poor man. The concept of information, if it can be quantified, could thus lead us to a solution to that long-standing problem of theoretical welfare economics - the quantification of the concept of utility⁽¹²⁾.

In principle, information as broadly interpreted above can be quantified in accord with the precepts of thermodynamics and information theory^(112, 113). While the problem is too technical for the purposes of this general exposition, the articulation of a single example may serve to give a modicum of credibility to the thesis.

Let us refer again to the rich man and the poor man and to a simple-minded interpretation of the concept of information in science. Consider the two men confronted with a field which contains the experiential venue of both of them. Now a measure of the information content of an observational field is evaluated in science as the logarithm of the inverse of the total count of distinguishable classes of objects in this field-of-view. A rich man (being better educated and having wider experience in entertainment, travel and consumption) will record a higher class count and will therefore record a lower numerical value for the information content of the

environment.

Now a ten-dollar bill is a measure for a distinct group of objects in the field-of-view (theatre tickets, cans of beans, etc.,) so its value in energy units as perceived by various observers will be in inverse proportion to the logarithm of the number of distinguishable classes which is inclusive of that group of objects. Whereas the poor man interprets "theatre tickets" as unique to the class "movie tickets", the rich man interprets the same term as inclusive of the classes "ballet, opera, legitimate theatre and movie tickets". The poor man thus accords a value to the ten-dollar bill which is

$$\ln 1 - \ln 1/4 = \ln 4 = 1.4 \quad (10)$$

energy units greater than does the rich man. Roughly speaking, the value of a given unit of exchange to an individual lies in an inverse relation to the number of perceived consumption options for which the unit can be exchanged. This result is in agreement with our normal intuitive perception in such matters.

A.6 Relationship of Theory to the Social Report

The tactic behind our classification of the social slate into antagonistic duos now becomes clear. In every enumeration of social activities there exists a group which abets the dissipative or consumption process - entrepreneurship, exploration, scientific or artistic creation, activism, crime and disease. This group as a whole is manifested as the maximal part of the minimax principle and is the major contributor to transformations in society. There exists a second group of moderative activities, striving for a balance with the above mutative activities, which is manifested in the minimal part of the principle.

This group includes law enforcement, social mobility and socialization within the educational system. The antagonistic forces of optimization which control the dynamics of the development of societies in stationary environments invariably establish stability points defined by the minimax principle. Social systems in variable environments, which are the rule in this age of fast communication, can do no better than sustain marginal stability through spontaneous or controlled adjustment of the balance of dissipative and organizational tendencies. The social reporter, and the policy-maker who takes advice from him, should be concerned ultimately with a quantification of the antagonistic forces and their modes of resolution.

In summary, we propose as a law of nature that all social systems are basically imperialistic. That is, given an environmental source of nourishment, a social system or sub-system will adjust itself to maximize the intake of nourishment from that environment and as a corollary will maximize the conversion of available energy into (waste) heat. At the same time it will tend towards dynamic efficiency, which is to say it stores as much available energy as is allowed by the constraints. This is the essence of the "minimax" premise.

Tentatively accepting the proposition that the social reporter (or educational commissioner) is an agent for social stabilization and given a complete empirical description of a social system, how should the social reporter analyze his data and proceed to recommendations for change? Firstly, he must carefully define his own frame of reference as from within or without. If from within he must share in the imperialistic drive of the system, since he is part of it. If from without, but necessarily from within a larger social system, he must act as a moderator between the imperialistic drives of the sub-systems, at the same time abetting the imperialism of the whole.

As an essential aid to analysis he should learn to quantify the concepts of dissipation and information within the social framework. He should also master the art of recognizing the symmetry elements of a social system; not

only the static configurational ones, but also the dynamic symmetries of flow patterns within the system.* Institutional bureaucrats have a strong tendency to emphasize the configurational or structural elements of symmetry to the detriment of the dynamic elements associated with effective lines of communication.

The social reporter should also be prepared to ferret out the relationships between the external and internal constraints and to anticipate changes in the stability character with changes in the environment. In particular, he should accumulate and examine data which is definitive of the response of the system to external or internal (fluctuation) perturbation for it is such data which gives insight into the dynamic character of the system near its minimax (saddle point) configuration.

Finally, he should appreciate the connection between the creativity of a system and perturbations from within and without, and assure that all models which he projects are not so constrained that long term creative evolution is stifled.

*We are reminded of a Van Gogh painting involving some particularly assertive-looking plants and trees and turbulent and foreboding clouds in the sky. This painting completely ignores the conventions of spacial composition yet it is perfectly composed. This is because the viewers intuition for the dynamic elements of growth and fluid flow tells us that the scene is in dynamic balance.

